

# The DENTAL JOURNAL of AUSTRALIA

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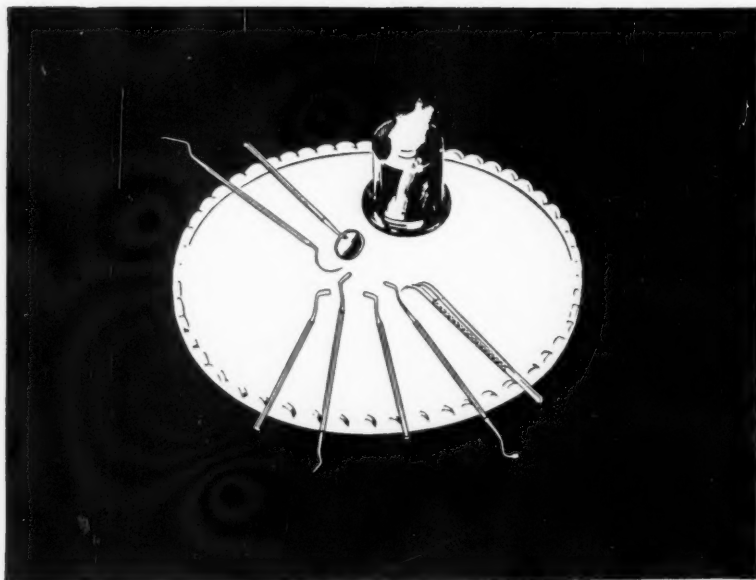


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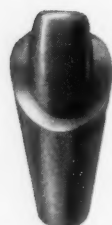
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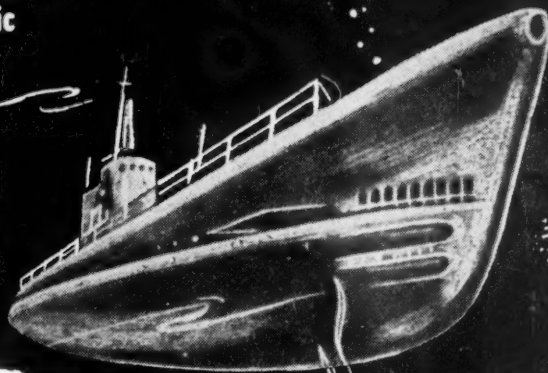
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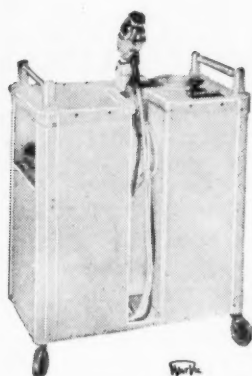
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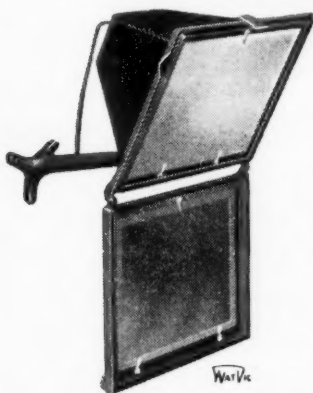
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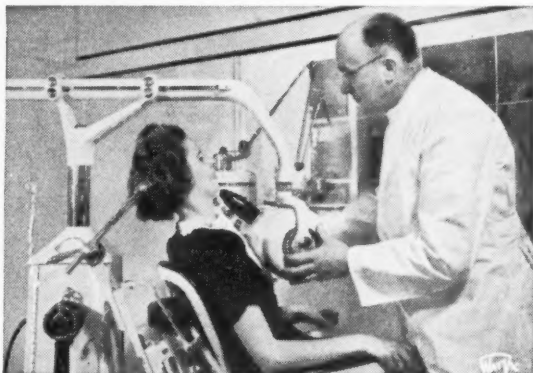
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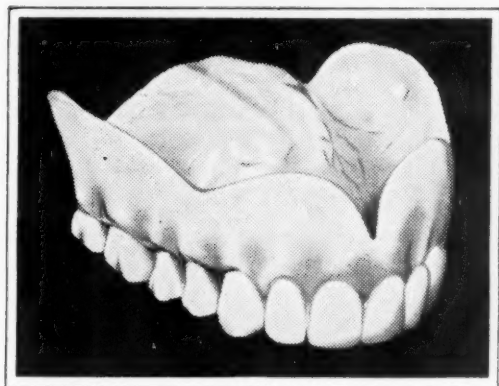
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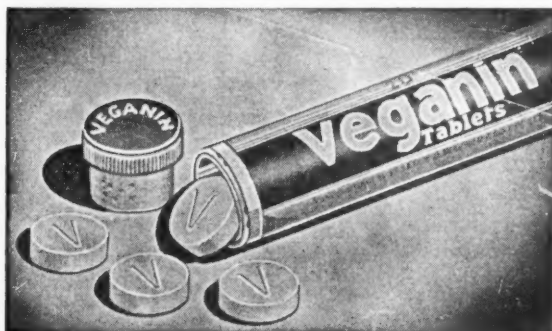
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## Nutrition and Diet\*

R. Harris and F. W. Clements.

### The Chairman:

The twin subjects of diet and nutrition are notoriously difficult to discuss dispassionately and objectively. Among the reasons for this difficulty may be mentioned (1) the confusion which so often attends the use of the terms diet and nutrition; (2) human prejudices and predilections concerning food and (3) ignorance of what constitutes good diet and good nutrition.

Our attitude towards food varies according to the circumstances of our individual way of life. Hence our reactions to the purely instinctive or physiological urge to satisfy hunger will be modified by considerations relating to social, cultural (anthropological), emotional (psychological) and economic elements in our life. The application of scientific knowledge always lags behind its acquisition and perhaps nowhere more than in dietetics and nutrition. We choose to eat what we like rather than what is good for us, and it is this attitude which makes the dietetic control of disease (and complementarily the dietetic maintenance of health) so difficult.

### Mr. Harris:

I wish to raise some of the problems with which we, as clinicians, are faced. One of the greatest difficulties is that of deciding whether or not a patient is in a state of nutritional well-being. How can we be sure that the patient's diet has adequate vitamin content or that adequate absorption of the ingested vitamins occurs? We can take the values obtained by dietary analyses, interpret them with the aid of arbitrary food tables, and assume accordingly that the patient has or has not a certain type of dietary regime, but is our assumption valid? Does the age factor come into this problem, in that absorption of certain substances from the intestinal tract differs according to the age of the person, with a resultant change in the nutritional status of the individual?

One of the most difficult problems is that of the inadequately nourished, edentulous patient, who is usually in the age-group

where certain changes have occurred or are occurring in the human organism as a whole. With age comes a decrease in appetite and in intestinal absorption so that, in spite of the consumption of a reasonable diet, certain deficiencies result. When teeth are lost, a period of adjustment to dentures is inevitable and nutrition suffers. We find that as the patient approaches old age there are factors operating against the absorption of certain food elements. It has been stated that by 65 years 35 per cent. of people do not secrete acid after a meal.

Thus, there are certain problems of nutrition which concern older people and I think that is a field where we have a great deal to learn.

Some other problems that we have to face in the older, edentulous patient are obscure lesions in the tongue, in the lips and mucosa. The patient complains of pain and burning or tingling and sometimes may suffer from leukoplakia. The wearing of dentures becomes an impossibility; food has to be taken in special forms or otherwise not masticated at all. The diet of these patients is often grossly deficient, consisting mostly of a round of toast and a cup of tea for breakfast, and a round of toast and a cup of tea for lunch. In the evening such patients are too tired or too bored to be bothered with an evening meal and so they have nothing. This goes on continually. Vitamin reinforcement is certainly desirable in such cases, in addition to correction of the diet. It is very difficult to get people to realise early the need for establishing a dietary programme as a form of insurance against the problems of age.

Let us consider now the younger age-group. Here we are primarily concerned with the problems of dental caries. It is easy for us to take the formula of, say, Jay and Becks and to establish a programme of dietary control for the reduction of caries experience. Is it right that an adolescent in whose mouth we may find 13 or 14 carious lesions should be placed on a dietary regime in which the refined carbohydrate is drastically restricted (say we reduce the intake of refined carbohydrates to less than 100g. a day with a total calorie intake of, say, 1,500 calories)? Are we doing any harm to that patient, especially an adolescent girl? Do we know enough to be sure that we do not cause harm to the organism as a whole? If an adolescent girl about 9 or 10 stone in weight is put onto such a diet, the loss of weight becomes very obvious. I would like to be quite sure that when we do such things we are not disturbing the organism as a whole.

\*A record of the Proceedings of the Discussion Group of the Institute of Dental Research, United Dental Hospital, Sydney, 14th October, 1953. Chairman: N. E. Goldsworthy.



It has been said that the easiest way to control caries is to control the diet, but I consider that it is very difficult to change dietary habits which have existed for years. I should imagine that these established dietary habits are one of the things which make dietary control almost impossible, except in isolated instances, unless you have patients who are inmates of some institution.

Taking first things first, I suppose one should consider the requirements in pregnancy and lactation. It seems important, seeing that the foetus is in effect parasitic, that all available sources of nutrition should be at the optimum for the mother during the period of increased demand. Minor or subclinical deficiencies which are present in the average individual could be exaggerated, or hastened, by the needs during pregnancy.

There are some who say the diet does not influence the developing dentition in the pre-natal period—that this influence is projected to the postnatal period. Some observations made at Cambridge, England, on the caries incidence in five-year-old children over certain periods of time (Fig. 1), show that in the 1917-1920 period there was a big fall in the caries incidence; in the 1920-1923 period there

was a similar fall. Is this a two-fold effect? Is the first fall due to environmental factors operating in the mouth and the second fall the result of good nutrition for the mothers (and fathers) of the children conceived during the 1914-18 war?

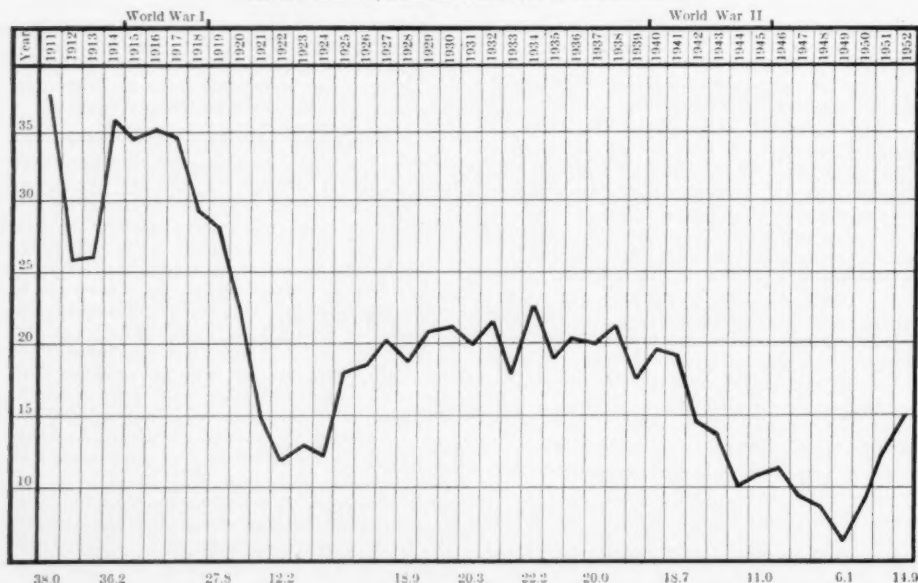
It seems that, if the foetus absorbs something like 60-65 per cent. of its total calcium requirements in the last two months of pregnancy, the mother should be provided with adequate diet to meet these requirements. If she is not, there will be some loss from her own skeletal calcium pool, particularly if she breast-feeds her child.

Next, it would seem that early infancy is a vitally important time for establishing the individual food patterns and food habits that are likely to be followed for the rest of a person's life. Food habits, likes and dislikes, seem to begin then. They may be altered later to a certain extent: some habits can be changed by reasoning with the patients, and emotions also play a large part. Special techniques are essential to make any real progress in this field.

A major difficulty which must be kept in mind is that nutritional status is not easy to define. Changes in nutritional status seldom

Fig. 1.

Chart showing the percentage of decay present in the Temporary Teeth of the Five-Year Old Group of Children before treatment, from the Years 1911 to 1952 inclusive.





show for a considerable time, unless the subject is at a stage of the life cycle where rapid physiological changes are occurring. Any diet therapy instituted to correct nutritional deficiency in such cases must therefore be patiently continued over a long period.

In concluding this extremely brief survey of some of the problems faced by the clinician, I would raise the matter of the value of dietary analysis by questioning of the patient. Can it be assumed with confidence that the patient's answers are sufficient? If not, what other tests are available and can be accepted with greater confidence?

#### Dr. Clements:

I think, if we are going to look at the problem of diet with respect to dental caries, there are one or two fundamental principles that we must first consider. One of these, raised by Mr. Harris, is what do we mean by the physiological requirements or how are we to interpret the physiological requirements of children, for children, I think, are our main interest with respect to the prevention of dental caries. To answer that question is rather difficult because of the confusion that exists in the minds of nutritionists about physiological requirements. There have been several attempts in different parts of the world to develop standards (such as Recommended Dietary Allowances or quantities of nutrients and calories required) which we are expected to use as yardsticks, either to decide if a diet is adequate or to construct a diet. Most estimates of requirements are so emotionally tangled with the desire not to make a mistake that very few people will attempt to critically appraise recommended allowances for children with the object of seeing whether they are as stated. Most of the figures have been developed from balance experiments or by noting the diets of children and endeavouring to estimate whether the diet is adequate and what is the effect of that diet on the health of the child. Let us consider calcium as an example: an analysis of calcium-balance experiments gave a mean value for adults of 0.68 g. However, a quantity is added for safety and so the National Research Council of America's figures for calcium end up as 1 g. calcium per day for an adult male or non-pregnant, non-lactating female. The margin of safety is more than 50 per cent. above the mean.

The figure for protein requirement is somewhat similar. The average for protein was 44 g. per day with a range from 25 g. to about 68 g. but by adding a margin of safety to the mean the recommended figure becomes

70 g. per day. The figure of 70 g. was that found by Voit and Rubner in their work on German labourers in 1878 and to date no one has suggested any reduction in this figure (which is 1 g. per kilogram of body weight). The average adult male in this community does not weigh 70 kilograms; he weighs nearer 65 kilograms, so the figure of 70 g. could be reduced to 65 g. per day in this country on these data alone. Recently Stare and his colleagues found that all people studied by them were in nitrogen balance on an intake of from 35-45 g. protein per day. They concluded that the adult male needs only 50 g. protein per day, yet the figure has not been reduced from that originally set down.

Fewer observations have been made on children but the same procedure has been used, namely, a mean has been struck and a margin added for safety. This means that, if you have 100 children who are on various diets, a number of them will be getting adequate protein (they won't be in nitrogen balance because *extra* nitrogen is needed for growth) from an intake of, shall we say, 35 g. protein per day. However, there will be some children who will be getting adequate protein on 30 g. per day and others who would need up to 55 g. per day. Now the child whose dietary history you are attempting to evaluate comes somewhere in this range, but where? Examinations of two children, both of the same age, sex and having an apparently identical nutritional status, may indicate that they have protein intakes of 35 g. and 50 g. per day respectively.

This brings us to one of our greatest difficulties—the lack of adequate techniques for measuring nutritional status. The Second Session of the Joint Committee on Nutrition of the World Health Organisation and the Food and Agriculture Organisation at its Rome meeting two years ago discussed the question of nutritional status and its measurements. It concluded that there was *no*, I repeat, *no* biochemical test that could be used for the assessment of nutritional status and that the only laboratory test worth using in any survey was the haemoglobin and mean corpuscular haemoglobin. Serum protein levels are valueless. The Committee concluded that the most satisfactory procedure was the clinical appraisal of the subject, using certain criteria for skin, hairs, eyes, mucous membranes.

There is the difficulty that different observers tend to have different standards. In Australia the standard of nutrition is particularly high; even where malnutrition might be expected (inner industrial suburbs) the

number of children who would be considered malnourished is small. That fact is very important to dentists, because it would seem that conditions necessary for adequate overall nutrition are probably not so stringent or so severe as the conditions necessary for the prevention of dental caries. I do not know, I merely pose as a possibility, that dental caries might be *not* a sin of omission but a sin of commission, i.e., people eat things that they should not eat when already they are eating all that is necessary to give them an adequate nutrition.

Mr. Harris posed a question which I think is very important. I am really horrified at the suggestions to reduce the calorie intake of an adolescent to below what is apparently necessary for maintenance of adequate growth. Growth (or weight) at any given time is difficult to interpret, but a growth curve over a period of time is most useful. If an adolescent's diet is reduced to such an extent that the weight becomes stationary or declines, you are doing more than just disturbing the balance within the body, you are actually doing physical damage to the tissues. A child of 14 or 15 has a calorie-requirement of about 1800 calories. If it is reduced to 1500 calories by eliminating as much carbohydrate as possible, the calorie *need* of that child is not reduced—the energy requirement remains the same. The child plays, etc., and burns up more calories than the diet can provide as evidenced by the fact that the child loses weight. The child uses all the calories in the diet for energy—not only the carbohydrate and fat, the normal source of energy, but also the protein. Consequently protein is not available, either for growth or for essential enzyme formation and enzyme structure.

I believe this is the type of damage caused by such drastic dietary restrictions as advocated by Jay and others. This is extremely important in adolescence because at that stage there are considerable changes in endocrine activity with increased demands for the constituents of enzymes. A group of Italian investigators, basing their beliefs on their studies of adolescents during the war, suggested that defective diets during adolescence delay endocrine activity and endocrine function. The endocrines and their secretions are proteins and so protein is needed for hormone production. If sufficient protein is not obtained there is no secretion from the ductless glands, including the pituitary gland with its growth-promoting factors. This is probably one of the reasons one sees such disturbances in growth as delayed maturation or delayed development arising in people who have inadequate calories or inadequate protein intake during adolescence.

Another point which has been raised is the relationship between specific lesions and specific vitamin intakes. I would like to associate myself with Mr. Harris in recognising the difficulty of relating specific gingival changes to deficiencies of one or more vitamins. However, an interesting observation was made some years ago in Tasmania which I think has some significance. In Australia the supply of foodstuffs rich in vitamin C follows a distinct seasonal pattern. In the eastern states the vitamin C content of foodstuffs is relatively high at the beginning of the year; it is low during April, May and early June and then rises again. The first drop is due to the ending of the apple, berry and tomato crops and the following rise is due to the incoming orange and then potato crops. The point I wish to stress is that the drop comes in the autumn. In Tasmania the reverse holds. There is a high concentration in late summer and autumn due to the large berry and apple crops: the supply is lowest in the springtime.\*

Oranges are not shipped from Victoria to Tasmania in any quantity and as a result the consumption of oranges in Hobart and Launceston in the orange season is about a quarter of that in Victoria. It so happened that we were making some nutritional surveys in Tasmania at the time when the vitamin C concentration was at its lowest and we found a lot of children with bleeding gums: nothing else but bleeding gums. We were able to go back later in the year and examine the children and we found that the bleeding of the gums occurred only in the springtime. We were also able to carry out biochemical studies of plasma ascorbic acid and found that the level followed the pattern of availability of vitamin C in the fruit. I am not suggesting that gingivitis is wholly due to vitamin C deficiency but the gingival lesions did not appear to be of bacterial origin and inadequate vitamin C intake seemed to play some part.

Another point worthy of discussion is the question of pre-natal influences. I think we all recognise now the importance of the last two or three months of pregnancy in regard to the storage of nutrients. The foetus brings over into post-natal life large supplies of nutrients (e.g., calcium and some of the B-complex vitamins) which it uses to augment the supplies it gets from the mother's milk or other sources. If a mother's diet has been inadequate during pregnancy, her baby starts life much more handicapped than one whose mother's diet has been adequate. We confirmed

\*This resembles the pattern in Northern Europe where nothing grows in the severe winter and consequently vitamin-rich foods are not available in the spring. Scurvy occurs in Sweden, Norway, Finland and Northern Germany in the springtime because of this.

this by making a series of studies of X-rays of the long bones (usually at the wrist) of infants from one month to two years. We related the appearances of the bones to the dietary intake of the mother during the latter part of pregnancy and particularly to milk intake. If the calcium or milk intake of the mother had been low, decalcification or imperfect calcification of the metaphyses of the long bones was always seen.

We have also followed a group of 100 children for ten years from the first year of life. We studied three things (one of which I was not competent to study and which I present with a great deal of hesitation to this gathering: we endeavoured to record the extent of dental caries). We also studied knock-knees and certain chest deformities which some textbooks hold are due to early rickets. We found they were three distinct, separate entities with no correlation between them. Further there was no correlation between the degree of calcification of the long bones in the first twelve months of life and any of these three factors. I do not know what that implies beyond saying that it would seem from our rather inadequate observations that inadequate calcium supplies earlier in the life of the child do not affect these three conditions, including the extent of dental caries.

#### Dr. Sullivan:

I am sure we all welcome opportunities of discussing these subjects for they are matters intimately bound up with both medical and dental problems, yet in which the members of the medical and dental professions in the past have each so unhappily ignored the others' difficulties.

I am restricting my remarks to problems linked with the prevention of dental caries. To reduce these problems to their essentials, it would seem that the great bone of contention is how the calorie-requirements of the individuals are to be met. The dentist will probably say "by eating whole grain cereals" and the dietitian "by having some sugar." Somewhere surely there must be a middle road. "Middle roads" are usually somewhat unsatisfactory compromises, but in problems of this nature, where there are so many divergences in requirements, in financial considerations and in personal tastes, I think it may be the best that we can hope to achieve in finding a solution. Moreover there is some justification for suggesting such an approach to our problems. Pedersen of Denmark considers that:

A close study of conditions in East Greenland indicates that caries in this area will not occur to a greater

extent when imported food amounts to about 20 per cent. of the diet than when this is 5 per cent. If, however, the total intake of imported food averages 80 per cent., caries prevalence in the permanent teeth will be considerable.

Also, the work of Lundquist and Gustafson at the Mental Hospital of Vipeholm indicates that sugar taken with meals is not nearly so likely to cause caries as the indiscriminate eating of sweets between meals.

A far more difficult problem is whether a food pattern mutually satisfying to all (and here I include not only the dentist and dietitian but also the consumer of food) *can* be implemented and, if so, whether it can be *maintained*? One of the great difficulties here is that the problem is intimately bound up with emotional and other factors. Scott, after carrying out animal experiments, classified appetites under the headings of true hunger, trivial preferences and learnt appetites. Depending upon the classification into which the animal's appetite fitted so the results differed. Harris also concluded that the apparent nutritional wisdom of animals is not due to any inherited instinct for the right foods but rather to a previous experience of the beneficial results which followed its consumption. In other words, "you get to fancy a little of what did you good promptly" and I think the key word is "promptly."

These animal experiments suggest two possibilities. Firstly, it could be that the rapid supply of energy by the ingestion of carbohydrates gives the consumer a prompt feeling of greater well-being and so makes him like those things more than others. I have not met any child who, despite a diet comparatively free from refined carbohydrate, does not display some innate preference (as opposed to an inculcated distaste) for some form of sweet food. Secondly, as most of us are never hungry, satisfying of our appetites is brought about by pandering to trivial preferences.

To open the discussion, then, I shall suggest that a lot of our troubles are due to our bad eating habits. We never approach a stage of true hunger. This causes us to develop trivial food preferences rather than the "learnt appetite" and thus we select a wrong food pattern. In short, our eating patterns are incorrect, thus leading to incorrect food habits.

#### Mr. Cameron:

One of the main points to come out of Dr. Clements' talk is that, when we are considering dietary alterations, we must look at the child as a whole. I am quite in agreement but I also think that in the

degree of attention devoted to them teeth are usually well down the scale, so I would counter by saying that, when we are considering the whole child, we must consider the mouth as part of that whole.

Dr. Clements has said that in and around Sydney he could find very few children who were in an unsatisfactory state of nutrition, which indicates that over the last twenty or thirty years there have been radical changes in the ideas of the general populace on nutrition as applied to the body as a whole. That fact should give us heart to try to alter the outlook of the masses so that they will consider the welfare of their teeth when deciding upon their nutritional requirements. Provided the nutritionist is prepared to recognise the differences (particularly physical ones) between various foodstuffs which are nutritionally equal, I think we may be able to bring about some alteration in the dietary pattern of our children which will reduce the prevalence of caries. At the moment the only people who are particularly interested in the welfare of the teeth are dentists and a few parents; also the propaganda to oust the undesirable foods from the diet comes mainly from the same sources. Unfortunately all members of the dental profession are not unanimous. The following quotation is taken from a paper in a reputable journal:

... the efficacy of an adequate diet in the control of caries seems to be proved. However, in the eyes of the patient the drawbacks of such a diet involving a drastic reduction of the use of sugar and fermentable carbohydrates will often be greater than its advantages. There can be no question of imposing it or even of recommending it to the bulk of the population. The practitioner may usefully advise it to the patients who have very active decay. His advice is not always followed: we cannot hope for much from this method.

I hope that this defeatist attitude is shared by very few people, because, if it is the outlook of the majority of the dental profession, we are faced with a hopeless task.

The emphasis on correct diet should begin when the child is very young, for once a dietary pattern is established it is very difficult to change. I think such education should begin in centres such as Baby Health Clinics. These are provided with information by nutritionists but, as I've said before, a lot of them do not yet recognise the difference between recommending cornflakes and recommending oatmeal. Also they suggest that most things must be sweetened with sugar in order to make them palatable for the child. Here is probably where our main difficulty begins. The child becomes used to sweetened food, whether it be orange juice, custard, ice cream or stewed fruit and the desire for sugar is thus well established. Once the damage is done it is very easy to push the child farther down-

hill. In general I think parents make very little attempt to stop them going downhill: they usually grease the tracks.

#### Dr. Goldsworthy:

The possible influence of dietary and nutritional factors, operative during the short pre-natal period, upon dental health during the long post-natal period, has already been mentioned. Figure 1 shows the prevalence of caries in five-year-old children in Cambridge for each year from 1911 to 1952. It is clear that there were two remarkable recessions in this prevalence, one after the First World War and another after the Second World War. Closer study of the figure suggests that those children conceived during the years when food was rigidly controlled by rationing acquired pre-natally or in the nursing period a resistance to caries not observed in other children. There is, however, a suggestion that the anti-caries influences, to which these war-time infants were exposed, were both pre-natal and post-natal.

#### Dr. Lilienthal:

I would like to refer to the graph described by Dr. Goldsworthy which indicates that pre-natal influences may play an important role in the development of caries-resistant teeth. The incidence of caries in five-year-old children was lowest between 1919 and 1924 (i.e., in the teeth of children born between 1914 and 1919). It is possible that the cause of the decrease in caries prevalence in the period 1919-1924 was due to the war-time restrictions imposed upon maternal diets during pregnancy. Sognnaes has suggested that diet, particularly its sucrose content, is a most important factor during the formative period of the teeth.

Recently, investigation has been made of the inter-relationship between insulin and a hormonal antagonist of insulin produced in the pancreas. It has been shown that this hormone, which is called glucagon, has an action akin to adrenalin and that there is an inter-relationship between insulin, glucagon and the pituitary growth hormone. The influence of these hormones on sensitive tissues, such as ameloblasts, is unknown. However there is some evidence to suggest that a diet which contains a large amount of carbohydrate stimulates the secretion of both insulin and glucagon. If these hormones affect tissues such as the ameloblasts, then such a diet during the formation of the tooth may have deleterious effects. If an individual ingests 70 g. carbohydrate, as recommended by the nutritionist, despite the fact that his

actual daily requirements are only 35 g., could this increase the secretion of some of the hormones thereby creating an imbalance and thus an adverse effect upon developmental tissues, particularly very sensitive cells like the ameloblast?

**Dr. Clements:**

I agree with Mr. Cameron that the nutritionist has a very real task to endeavour to persuade the population to reduce the amount of sugar consumption. However, there are community attitudes to sugar, i.e., a feeling on the part of the community that it is kindness to children to give them sugar. It is true also that the change in attitude to diet over the last 25 years has been astounding—there is no other word to describe it. I am satisfied that 75 per cent. of the mothers of children who are attending kindergartens around the city and even in the industrial areas know what constitutes a good diet for children and endeavour to give it to them. To have expected that in Alexandria, Redfern and Darlington 25 years ago would have been laughable, but I can assure you that it is a fact today. That has been achieved by education and it shows what can be done.

I was not aware that dentists were prepared to say without any equivocation, "If you withdraw sugar from the diet of children, we will guarantee that those children will not have dental caries." Now, if we are going to take this programme to mothers of young children, I rather feel we need that assurance with very solid backing, because we cannot afford to fail—we cannot afford to have them come back and say in five years' time: "Look at this child's mouth, yet he has not had any sugar over this length of time!"

**Mr. Cameron:**

I would not say that, Dr. Clements. Too many other factors are involved for us to be so dogmatic. I would be prepared to say that the continued reduction of refined carbohydrates in the diet of the children of Hopewood House may have contributed greatly to the lowered caries experience of that group of children. In a general observation, the caries experience among children in orphanages, even though no attempt is made to control the intake of such foods as jam, sweets, sugar and puddings, is lower than that among the children outside. I think that the regularity with which orphanage children are fed may play a great part; they have their meals at fixed times: they do not have the opportunity to eat between meals. If we could find an orphanage in which children had lived since birth, we might find that, despite quite

a high intake of sucrose, the children had a caries experience approaching that of the children of Hopewood House, just because of the regime. Boyd in America has suggested this as a mechanism. He thinks an adequate diet (if you can use that term) is what is necessary. He gave some children in orphanages up to 3 oz. sucrose a day at meals in addition to their basal diet and restricted the intake in others and found very little difference in the caries experience of both groups.

Dr. Sullivan has drawn our attention to work done recently in Scandinavia, where it was found that the eating of sugar with meals was not associated with nearly as much caries as the same amount of sugar eaten between meals. It would seem that the restricting of sugar may not be the only thing that has to be done. However, if we tell mothers to reduce their children's intake of carbohydrate, I think that after five years not many cavities would be found.

I would like to ask Dr. Clements if any harm can arise from restricting the intake of sucrose and white flour?

**Dr. Kirkpatrick:**

It is encouraging to know that most children are adequately fed and that dental caries cannot therefore be due entirely to a nutritional inadequacy. However there are other aspects of diet which do not always receive the attention that they should, namely the physical nature of the food, which is reflected in its detergent effect, its cellular nature and its function in promoting mastication.

**Mr. Levine:**

Is there any evidence of clinical scurvy associated with bleeding gums in Tasmania? I ask this in view of the fact that many writers consider that, unless there is clinical scurvy, there is no such thing as avitaminosis C.

**Mr. Harris:**

Dr. Lilienthal, were you referring to refined carbohydrates or any carbohydrate? Marshall Day and others found that some Italians had a high carbohydrate diet, higher than other European countries. They were undernourished, but the incidence of caries was extremely low.

**Dr. Dewar:**

I would like to mention the form in which food is taken. Bibby classified the "caries potential" of food material. He tested



various materials such as drinks (tea and various soft drinks) and biscuits (cookies and various sticky substances). The method was to investigate the acid-producing power of the food when it was present in a certain concentration. A standard amount was crumbled up with water in a mixing machine and then incubated with saliva to see how much acid was produced. Also, the retentive properties of the food were estimated by determining the amount of carbohydrate that was present in mouthwashes of persons who had eaten a sample of the food.

The method was rather approximate but the results corresponded with the clinical observations. Tea and other substances that are quickly eliminated from the mouth had a very low caries potential; sticky foods, such as certain biscuits and some types of fancy breads that contained a lot of sugar, had a high caries potential. However, there were a few surprises, particularly amongst the natural foodstuffs. Substances such as dates and prunes, that are recommended as good substitutes for refined carbohydrates, had surprisingly high caries potentials but they were not substances one would eat in large quantities.

#### Mr. Cameron:

The relation between appetite and nutritional requirements has been mentioned several times tonight. It would seem that most of the children around Sydney get sufficient nutrients and I do not think there is any doubt about the level of their intake of cake and sweets. If they are adequately nourished, is it their appetite that demands further consumption of these carbohydrate foods? Further, if they are well nourished, why don't they put on more weight when they eat these foods to excess? Is it possible that in some children the need for sweets is an expression of an inadequate diet?

#### Dr. Clements:

I think they just like the taste of a sweet. I do not know that we have any very accurate figures on the consumption of sweets. We *think* children eat a lot. My only experience of this was during the war when attached to the Air Force to investigate the diet of the airmen in relation to fatigue. They said, "Do not forget to take into account the Canteen. They eat a tremendous amount of sweets from the Canteen." However it was small compared with the total calorie intake. I think we go on impressions of what we see a few children do: we assume that they do it every day. I think we need some facts before we draw any deductions.

## Lost—Fine Arts in the Fallacy of the Ridges\*

Earl Pound, D.D.S.

Patient happiness should be the goal of every prosthodontist as he fabricates his dentures. To achieve this result of a happy patient there are three distinct phases which should be considered: (1) health of our patient's body and mind, (2) complimenting the patient's appearance, (3) the mechanics of denture construction which involves replacing lost structures and co-ordinating the occlusal surfaces of the teeth.

This paper will discuss these three subjects in the light of present day trends and will attempt to show:

1. That the first two phases, i.e., health and appearance, do not occupy the important positions they should in our thinking, our teaching, and our research.

2. That the mechanical methods we are employing to replace teeth and other lost structures make it most difficult for us to develop natural looking dentures or denture patients.

Happiness is a state of mind. It is brought about by a feeling of well-being, security, harmonious relations with others, and confidence in one's self. The loss of teeth, or even the contemplated loss of teeth, can be a severe blow to these finer senses and our first duty to the prospective patient is to assure him that none of these senses will be in jeopardy.

In other words we must thoughtfully and carefully condition our patient to the problems ahead. We should not fail to inform him of the unpleasantness in store for him, especially the one presenting severe problems where comfort and chewing efficiency cannot be brought up to standard. He should be advised of this unfortunate situation; but at the same time assured that his personal appearance may even be improved. In this way we can maintain high morale and build confidence without promising the impossible.

This appearance phase of denture prosthesis is one that the patient, his family and his friends, are in a position to praise or criticise, and we know there is nothing that will make a patient happier and more determined to

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master the problem of wearing dentures than the conviction that his dentures are an asset to his appearance.

The development of a pleasing oral and facial expression depends upon our ability to replace in our dentures, both as to contour and colour, all of the structures that have wasted away. To reproduce or to imitate nature should be our aim. To compromise, to alibi, to accept anything less, will only give an end result that will be proportionately unnatural.

Imitating nature with dentures involves the application of the following three basic principles, each one dependent upon the successful application of the others.

1. Anterior and posterior teeth should be replaced in the same natural position from which they came relative to the lips, the cheeks and the tongue.

Devan<sup>1</sup> in a recent article expressed himself relative to these ideas. His response is typical of the thinking that prevails today, and which has existed since its introduction many years ago. He stated:

The objective should be the constant preservation of what remains rather than the meticulous restoration of what is missing.

Whether or not this statement is justified will be discussed subsequently, but here I would like to point out that it is just such a prevailing theory in dentistry which, when practised, has made the development of natural aesthetics extremely difficult. It is the meticulous, or we might say artistic, imitation of the normal that is our greatest asset to natural appearance and therefore patient happiness.

As I see it, the artistic has been talked out, taught out, and actually left out of denture

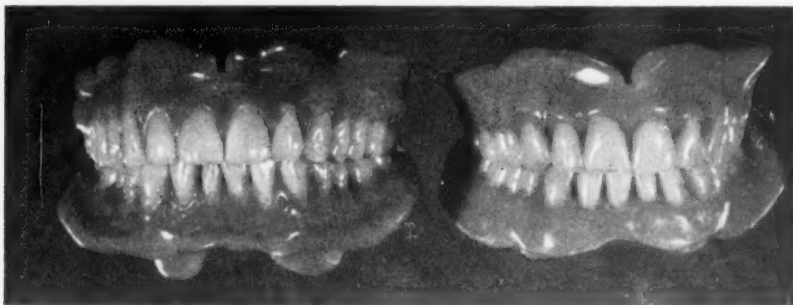


Fig. 1 (a and b).—Examples of routine and aesthetic dentures made for the same patient.

(a) These dentures demonstrate the three basic principles necessary to developing an imitation of the natural: (i) the teeth are set more closely to their original positions; (ii) the interseptal tissues are slightly stippled and fill the spaces with more convex natural contours and the basic anatomy of normal dental arches is reproduced; (iii) this anatomy lends itself to the tinting of the denture base which creates a more pleasing cosmetic result when seen in the mouth.

(b) These dentures exhibit the typical smooth, flat, and highly polished surfaces so common today. The interseptal tissues are concave, pointed, and encourage food deposition between the teeth. The anatomy of the supporting structures from the periphery of the dentures to the gingival of the teeth is purely mechanical and the mono-colour base material advertises artificiality.

2. The basic anatomy of the dental arches should be fashioned about these teeth in all its natural contours. This cannot be accomplished unless the teeth are replaced according to nature's principles.

3. The exposed surfaces of the denture should then be tinted by any approved method to more closely imitate the colour of living tissue. Colour is dependent upon form, and successful colour affects can only be made if the contours of the denture basic anatomy are present (Fig. 1).

This technique is quite different from the routine procedures which have been followed in the past by the average dentist and dental laboratory, and the value of such methods has also been questioned.

prothetics. Art is no longer frosting on the cake. It used to be—when cakes were only for kings and their courts—but today it's different.

Karl<sup>2</sup>, of the University of California at Los Angeles, says:

Art is almost one with the staff of life. Art is the universal manifestation of our civilisation.

He continues:

The artist must be the balance between fine art and the production of things for everyday life. It is not a luxury, it fulfils our human needs. Art makes the difference between happiness and misery. Art embraces not just the painting on the wall but everything that man has thought out.

Now isn't this true? There is hardly a thing that is designed today from the most modern of ocean liners down to the simple coffee pots

that is not designed for eye appeal. Eye appeal is today's greatest salesman. The artistic elements back of these eye-appealing contours are the beautiful french and hogarthian curves. They are apparent everywhere, and above all in the teeth and their supporting structures. The anatomy of the dental arches is but a composite of hundreds of gracious french curves. There are no sharp angles or flat surfaces.

Should we not recognise these facts and utilise the value of eye appeal when it is to the advantage of both dentist and patient?

Should we ignore this fundamental of basic oral art and stay with the flat and highly polished surfaces of the past?

Are we going to let ourselves develop into a group of biomechanical geniuses and forego the artistic architecture so important to aesthetics and patient happiness?

Should we not recognise that dentures of poor aesthetic quality tend to destroy everything that beauty culture is trying to do?

Should we not understand the significance of the enormous preoccupation and expenditure of money for cosmetic purposes?

And should we not also recognise the fact that all good business merchandising is based first upon appeal and secondly upon benefits?

It is logical to assume that progressive prosthodontists would be interested in studying and applying some of these fundamentals of good business. I sought to ascertain if this were true, and am sorry to report the result of my research definitely shows that prosthodontists are not working or thinking along these lines.

In attempting to evaluate this attitude of our men towards the fine arts of denture prosthesis, I first made a complete survey of all published articles that related to full dentures which appeared in the *Journal of the American Dental Association*, the *Journal of Prosthetic Dentistry*, and in the *Dental Digest*, from 1946 to 1952 inclusive. A total of 196 articles were reviewed, and while many phases of the subject were presented, for purposes of brevity these were re-classified into the seven categories as shown in figure 2. The number of articles in each class appears on the left side of the classification.

Here I would like to draw your attention to the fact that only three per cent. of the articles even touched on aesthetics, and that one and one-half barely touched on the ridges related to health and nutrition.

My second step was an attempt to evaluate the thinking and the desires of our prosthodontists. This was accomplished with the co-

| Articles |                     | Thinking |
|----------|---------------------|----------|
| 53       | Jaw Relations       | 119      |
| 31       | Teeth & Occlusion   | 95       |
| 88       | Materials & Misc.   | 70       |
| 15       | Impressions         | 26       |
| 3        | Ridge Preservation  | 39       |
| 4        | Esthetics Casually  | 8        |
| 2        | Esthetics Primarily | 2        |
| 196      |                     | 359      |

Fig. 2.—Statistics showing result of research in articles written and opinions expressed. The figures show the preponderance of effort and interest in the mechanical phases of prosthesis.

operation of the Postgraduate Division of the University of Southern California School of Dentistry. Eight hundred postcards were sent out, one to each member of our three prosthetic organisations. These men were asked to answer the following question, "What phase of prosthetic dentistry do you feel is most in need of research?" Three hundred and fifty-nine replies were received. These were classified in the same manner as the publications, and the result appears on the right side of figure 2.

Many interesting deductions may be drawn from this study, but the following three are of direct importance to this paper:

1. Over seventy-five per cent. of the prosthodontists are fit and function happy, definitely being most interested in the mechanical phases of prosthesis.

2. Health and ridge preservation is a fertile field for study. This is brought out by the fact that over ten per cent. of the men think this is the subject most in need of research, while less than one per cent. of our writers have any information to offer.

3. Aesthetics. In publications, in teaching, and in thinking, aesthetics is definitely in the doldrums. Out of five hundred and fifty-five prosthodontists studied and questioned, only four think aesthetics is of major importance, and only twelve others take more than casual interest in it. This is the situation that actually exists today, with all of those previously mentioned business principles confronting us, and with the demands for the artistic ever increasing in our American way of life.

It might be well for us to remember that it was only a short time ago that we were complaining bitterly to our tooth manufac-



turers for continuing to supply us with teeth from antiquated moulds<sup>3</sup>. They have seen the light and are responding. It might be that we also should be condemned because we have continued to mould and to fabricate our dentures in the same manner as was taught in the nineteenth century. Progress has been made in all phases of denture construction. Why not in *denture appearance*?

I have now brought two points to your attention:

1. That there are many sound reasons why we should strive for perfection in aesthetics.
2. That prosthodontists are not generally interested in doing so.

I would like to analyse this latter situation because it is not normal, and is not in keeping with the high standards we set for ourselves in this our chosen field.

Dentists the world over are conscientious, willing workers, ever desirous of benefiting their patients in every way possible. However, the aesthetic result of their labours and an analysis of these statistics indicate that they have not been filling the bill, and what is worse, they are not particularly concerned about it.

Certainly this attitude is not intentional. Could there be some subtle reason why this lack of enthusiasm for aesthetic improvement exists? Possibly there is and it could be due to something deeply rooted in early training which has created this negative thinking and which has inhibited interest and research in this field.

It is my belief this "something" is a false application of the first principle of aesthetics, *tooth positioning*. The first principles of aesthetics is replacing the teeth in the natural position from which they come. This principle has not been taught or applied simply because we have always considered the residual ridges as a control for tooth position. Bluntly, I am referring to the fact that the "tooth over the ridge" concept is a fallacy, and has possibly been a powerful influence in retarding the advancement of aesthetics and in discouraging research in the fine arts of prosthesis.

Basic aesthetic contours cannot be placed about teeth that are positioned unnaturally over ridge centres. The desire for better aesthetics will remain in the background as long as we persist in teaching this fallacy and in fabricating our denture bases simply as a medium to orient the teeth to one another and to the mucosa.

By setting teeth in this manner we accomplish only one thing in the affirmative, but three in the negative. In the affirmative we satisfy our mechanical ego by endeavouring to cen-

tralise our set-ups so as to satisfy the so-called law of statics. On the negative side we are condemning our patients in the following three ways:

1. We accentuate facial deformities and aid in creating the commonly recognised "Denture Look."
2. We provoke phonetic problems.
3. We handicap our patients in manipulating food, in deglutition, and with instability of the lower denture, because the tongue is so restricted it thrashes about like a lion in a cage that is too small.

All of these factors become multiplied as age progresses and we unwittingly subject them upon our older patients at the very time in life when they seek, more than ever, things that will enhance their remaining aesthetic values, and when comfort and relaxation are paramount in their minds.

Now if these statements are true, why then has this theory been so universally taught and so willingly accepted? There are two primary reasons:

1. Because we have been taught to believe in the theory of tilting and leverages.
2. Because we believe that setting teeth on ridge centres will prevent ridge resorption.

For many years these theories have provoked unnatural placement of teeth and we have submitted to this aesthetic stalemate in the belief that if we did not follow such concepts our dentures would play rock-a-bye baby and the ridges would fade away.

I firmly believe that these two theories are also genuine fallacies. Webster says a fallacy is "that which misleads the eye or the mind." I believe the residual ridges have been misleading both. The residual ridges should be considered as an ever-changing denture foundation and not as a control for tooth positioning. I would like to devote the next phase of this paper to bringing to your attention my reasons for making these statements. Let us first make a study of ridge formation and its subsequent resorption:

Figure 3 shows a cross section through the molar area of a patient with normal dentition and ridge formation.

Figure 4 is of the same model, the teeth having been removed, but the original outline of the teeth and anatomy retained for comparison.

Figure 5 shows normal ridge formation which occurs in approximately one year.

Figure 6 shows what happens as resorption continues through the years, the upper ridge centres moving medially and the lower buccally, developing the so-called small upper and large lower.

The teeth have been reset in the original positions so that a better evaluation of their original position in relation to existing ridges can be made.

The study brings to our attention a number of basic facts which I would like to emphasise:

1. If we wish to restore teeth in the original position from which they came, it is seldom if ever that they can be placed over the centres of resorbed ridges.

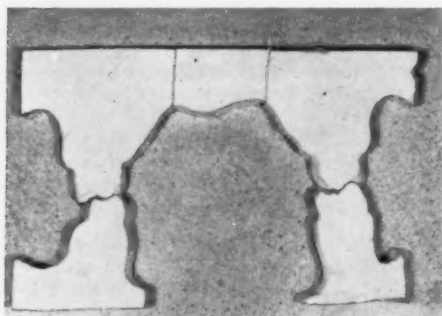


Fig. 3.—This is a section cut from the first molar area of upper and lower casts which are embedded in a control core. It shows normal anatomy and occlusion.

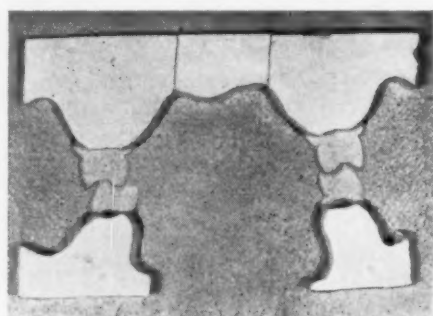


Fig. 4.—Casts showing the beginning of ridge formation after removal of the teeth. The control core retains the outline of the teeth.

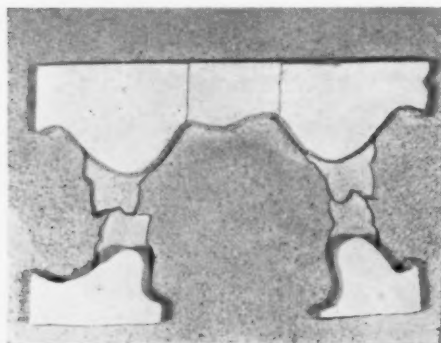


Fig. 5.—Casts showing the position taken by ridges following complete healing of the sockets. Note that the centre of the upper ridge has moved more medially than the lower, and that its centre is now opposite the lingual cusp of the original upper molar.

2. Resorbed ridges do not oppose one another at any time. This means that it is impossible to place both upper and lower teeth over ridge centres at the same time. Now, if the control of tilting and ridge preservation are dependent upon placing teeth on ridge centres, then we must decide to stabilise and preserve one and sacrifice the

other; or, strike a mean between the two, and thus to a degree condemn both. In other words, teeth do not come from ridge centres and we cannot place them there if we wanted to.

Let us now consider the principle of leverages and the theory of tilting dentures. A very fine illustration of the reasoning back of this theory was made in an article on Successful Dentures<sup>4</sup>. It compared the dentures and ridges to a plank lying on two saw

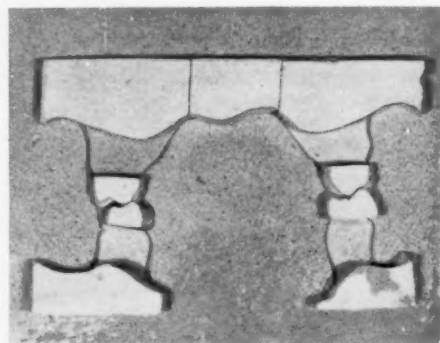


Fig. 6.—Casts now show advanced resorption. The upper ridge centre is still more lingual, but the lower ridge centre has moved buccally. The teeth have been replaced to show their original position in relation to these ridges and how impossible it would be to replace them over the centre of both ridges at the same time.

horses, the end of the plank extending beyond the horses. It showed the effect of force applied on the extended end of the plank, and simulates this tilting action to dentures with teeth set buccal to the ridge.

This commonly expressed theory is the most apparent of our fallacies. Dentures are

not made with free ends. Well constructed dentures utilise these free end areas to the utmost because they constitute the finest stabilising areas in the mouth.

Figure 7 shows these areas depicted at the ends of the wooden uprights. They are the zygomatic or malar areas of the upper and the buccal shelf of the lower. Landa<sup>5</sup>, Roberts<sup>6</sup>, Raybin<sup>7</sup>, House<sup>8</sup>, and many others have gone on record in support of this theory.

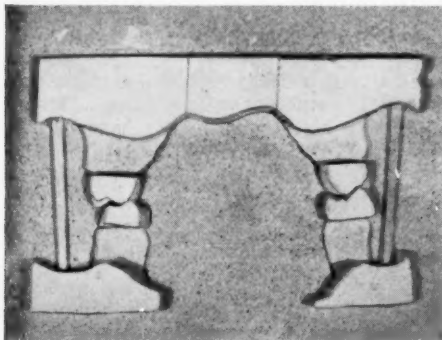


Fig. 7.—The wooden uprights on these casts show the stabilising areas that should be utilised in denture construction. They also show that teeth replaced in their original positions have adequate support against lateral stress.

**Raybin<sup>7</sup> states:**

The buccal shelf should be employed as a primary stress-bearing area because it lies at right angles to the stresses of mastication and is less subject to change than any other bony part of the mandible or maxilla.

**Roberts<sup>6</sup> states:**

The buccal shelf, if properly utilised, provides the most valuable supporting surface for the lower denture.

**Landa<sup>5</sup> says:**

The palatal vault constitutes the retentive area of the denture; the ridges are the supporting areas, and the zygomatic process on either side are the stabilising areas.

It is hardly necessary to point that if teeth are replaced in their original position, they always lie medially to these areas and receive the benefit of their stabilising effects.

Another factor to be considered which tends to offset the theory of tilting and leverages, is that the circumferential base area of a denture does not change throughout the years. The ridges become lower and lower but the outer dimensions remain the same, and as this condition progresses the direction of stress from the teeth becomes more and more at right angles to the base area.

I am not belittling the value of ridges as supporting areas, but I do believe that endeavouring to set teeth over the ridges in order to control the tilting is entirely unnecessary if these stabilising areas are utilised and the occlusion is properly balanced. Why inject additional complications into our work just to achieve this one very questionable feature?

Let us now consider the problems of ridge resorption. Since before the days of Gysi we have been taught that teeth over the ridge and ridge preservation were complementary to one another—in fact necessary to one another. This has been a universal belief. It is still practised universally. But—ridge resorption goes on unabated. Why does it remain such a problem when we supposedly have such a simple solution for it?

Actually, in one breath by admitting its prevalence we are admitting failure, and in the next breath we are pleading for more of the same treatment. If setting teeth over the ridge, or as nearly so as possible is the answer, then years ago ridge resorption would have been conquered as effectively as diphtheric antitoxin has controlled diphtheria. Apparently this is not the solution to the problem. There is no one simple answer to it, but complicated though it may be, the many factors involved in ridge preservation may be grouped under three headings:

1. Health, its maintenance or rehabilitation.
2. Happiness through aesthetics.
3. Balanced centric occlusion.

The second, or aesthetic, phase of work has been discussed as adequately as this paper will admit.

Let us now consider the health problem because I believe it is by far the most important. Good health and high tissue tolerance should be our aim and they go hand in hand. If we can develop tissue tolerance many mechanical weaknesses may go unnoticed. We have had a tendency to tune our mechanical thinking to patients of low tolerance because they are our major problems, but wouldn't it be a tremendous help in all phases of our work if we could engender high tolerance through better health, tougher tissues, and a happier frame of mind?

This is a subject that is ripe for study and research. My statistics show that there is very little information on the subject, but there is considerable interest in it and demand for it. To better serve our patients in this respect I would like to present the following suggestions which can be applied in our every day practices or evaluated by study clubs or research groups.

1. Every prosthodontist should gain the confidence and co-operation of one or more physicians who are trained and interested in our problems, so that we can better direct our patients in their search for continued health. We ourselves must not be too far behind these physicians because, after all, first and foremost we are doctors, and if we do not know what to do for the routine patient, in the absence of systemic disorders, we are not the prosthetic doctors we should be, and are not giving our patients the coaching that would be to our mutual advantage.

2. As doctors every one of us should take an active part in some study club or research organisation which has as its aim maintenance of health of the oral structures.

3. A thorough oral and radiographic examination should be made. Any anomalies that might create a hazard to health should be observed and corrected. If the patient is in a state of questionable health, a thorough physical examination by a competent physician should be demanded.

4. All questionable patients, and particularly those with undue resorption, should have a nutritional analysis before any dietary advice is given. This analysis should incorporate all solids and liquids ingested over a period of at least one full week. When analysed by a nutritionist, this may reveal some startling information that could be of tremendous value in rehabilitating these individuals.

5. If this analysis is not practical as a routine procedure, the next logical thing to strive for is a low carbohydrate diet. High carbohydrate intake is common among denture patients. Much research has been done to show the ill effects of such a diet as related to bone resorption. An article on pyorrhoea research<sup>9</sup> states:

Eighty per cent. of the pyorrhoeic patients consumed what appeared to be excessive amounts of carbohydrates. Past experiences have shown that restriction of the carbohydrate intake has been of considerable benefit.

6. Another serious problem today is the trend toward fat reduction in the diet. This is provoked by the tendencies toward weight reduction and the eagerness of physicians to maintain a low cholesterol level in the blood stream. They are doing this by advocating fat-free diets. Here we may have another fallacy. Cholesterol can be kept at a minimum in this manner, but the price the patient pays is heavy, because unless controls are established avitaminosis and other deficiencies may develop as many of the vitamins are fat soluble. These patients are, of necessity, also placed on a high carbohydrate diet again pro-

voking the very things we are attempting to avoid. Munroe<sup>10</sup> points out this fallacy most conclusively in his book and advocates the use of a high animal fat and protein diet and a very low carbohydrate intake. In this manner the cholesterol is controlled because the fats in place of the carbohydrates are then called upon to burn up the protein and none is left to go into storage, either in the form of overweight or cholesterol deposition.

7. Shriber<sup>11</sup> has pointed out present day trends in the excessive use of PREMERIN and thyroid by physicians in the control of the so-called "hot flushes" of the menopause. He has shown that this form of medication induces calcium loss, irritates mucous membranes and increases our denture problems. This is another point to consider in handling our middle-aged feminine patients.

8. Also we have that type of patient who suffers from either a thick and ropy saliva or a dry mouth. These cases are frequently written up in the literature but solutions to the problem are seldom forthcoming. Such patients should be classified along with our cases, and the same procedure of diagnosis and assistance should be instituted. Their problem is systemic, and the answer is not to be found in denture controls.

This resume on health has been given in an effort to emphasise its importance. This fundamental phase of our work should not be placed in the background. Too much of our time is apt to be spent on the mechanical phases of prosthesis at the expense of this type of professional service. It would be beneficial to recognise this condition so that we doctors would be influenced to tackle the problem of ridge preservation at its source.

The third phase of ridge preservation, balanced centric occlusion, has been shown by the statistics to hold the greatest interest and the most work has been done upon it. This paper is not in itself concerned with how centric, verticle, balance, etc., are obtained, but wishes to emphasise that they are extremely important to the equal distribution of stresses and to ridge preservation. I do, however, wish to emphasise the fact that developing these factors is one thing, but that maintaining them is another.

It has been shown that to a certain degree these factors are lost through processing and settling. As soon as they are lost, imbalance, prematurities, bruxism, and other problems develop which tend to create ridge resorption. I believe remounting and correcting occlusion after processing are necessary but inadequate. After the dentures have settled the cases should be remounted on the hinge axis, intra-

oral wax check bite records that can be exactly duplicated should be taken, and centric and balance perfected. This technique has been outlined by Schuyler<sup>12</sup> and Lauritzen<sup>13</sup>. This is possibly our surest control for stress distribution and may be a phase of denture construction easily overlooked because our patients readily develop convenient centrics that to the eye seem accurate. They are able to function, and we can very easily be deceived into believing that they are in true centric when they are not. The present teaching of Lauritzen is to be commended because he is making so many of us extremely conscious of this need, more so than anyone who has preceded him.

In conclusion I would like to compare the making of a set of dentures to a very tight game of baseball. In this game we get to bat but twice, each time we meet a different pitcher. The first pitcher represents aesthetics in dentures—he throws a mean ball. However, while difficult, we can score home runs off this man because it is possible for us to recapture natural appearance and expression. The second pitcher represents fit and function. It is impossible for any of us to score a home run on this man because we cannot make dentures that will function as well as the natural teeth. He fans many, some are able to get to first base, a two bagger is a rarity.

The point of this paper is that our scoring strategy is in need of review. Home runs are what we need, but as our statistics show we are so fit and function happy that we have been trying to make home runs off the wrong man. We should recognise the value of that one aesthetic home run in every game and train ourselves to make it, then concentrate on the mechanical phases and make as fine a hit as we can in this phase of our work.

The fine arts of denture prosthesis have thus been lost in the fallacies of mechanical concepts. This condition could be benefited by:

1. Evaluating residual ridges as a changeable denture foundation rather than as a guide for tooth positioning.

2. Devoting more time and study to improving the health of our patients for the preservation of their ridges.

3. Studying and applying the principles of nature as regards the placing of teeth and the anatomy of their supporting structures.

I should like to close by quoting two lines from the famous poet, Edgar Allen Poe—

"The learned is happy nature to explore,  
The fool is happy that he knows no more."

## REFERENCES.

1. De Van, M. M.—Biological demands of complete dentures: J.A.D.A., 45:524 (Nov.) 1952.
2. Karl, Professor.—News item, Los Angeles Times, June 4, 1952.
3. Pound, Earl.—Aesthetics and phonetics in full denture construction: J.California D.A., 26:179 (July-Aug.) 1950.
4. Kyes, M.—The laboratory's role in successful full dentures: J.Pros.Den., 1:196 (Jan./March) 1951.
5. Landa, J. S.—Torus palatinus and its management in full denture construction: J.Pros.Den., 1:236 (May) 1951.
6. Roberts, A. L.—Principles of full denture impression making an application in practice: J.Pros.Den., 1:218, 1951.
7. Raybin, N. H.—Analysis of the unstable and ill-fitting artificial denture: J.A.D.A., 39:177 (August) 1949.
8. House, M. M.—Personal instruction.
9. Seidler, B.—Systemic aspects of precocious advanced alveolar bone destruction: preliminary report: J.A.D.A., 40:49 (Jan.) 1950.
10. Munroe, D. C.—You can live longer than you think: Bartholomew House Inc.
11. Shriber, J. D.—Personal communication.
12. Schuyler, C. H.—Intra-oral method of establishing maxillomandibular relation: J.A.D.A., 19:1012, 1932.
13. Lauritzen, A. G.—Function, prime object of restorative dentistry; a definite procedure to obtain it: J.A.D.A., 42:523 (May) 1951.

## A Method of Controlling Dental Caries in Rats by Injections of Sodium Fluoride\*

L. M. Carr, M.D.S.†

### INTRODUCTION.

In 1938 Miller<sup>1</sup> showed that when, from the beginning of weaning, sodium fluoride was added to a caries-producing diet fed to rats there was a significant reduction in caries prevalence. As rats' teeth are formed before weaning, this effect was thought to be a result of post-eruptive exposure to the fluoride. Therefore the mechanism of this partial caries inhibition is different from that acting in humans who use a water supply which contains an appropriate concentration of fluoride.

McClure<sup>2</sup> showed that it required a continuous concentration of at least ten parts per million of fluoride in the drinking water to cause any significant reduction in the prevalence of caries in rats. In later experiments<sup>3</sup>

\*Based on portion of a thesis presented as part of the requirements for the degree of Master of Dental Surgery, University of Sydney.

†Dental Officer, Commonwealth Dept. of Health, Canberra.



he added 100 p.p.m. of fluoride to the drinking water of young rats for 85 days, after which a fluoride-free water was used and a cariogenic diet was fed, and the caries prevalence was found to be significantly low. This indicated that enamel could adsorb sufficient fluoride during the post-eruptive period to prevent caries from occurring and that it was not necessary for this element to be continuously ingested. This work was of importance in understanding the mechanism of the topical application of sodium fluoride as a method of caries control.

A third method for preventing rat caries by fluoride is that in which the fluoride is incorporated in the developing enamel. This has been done by Cox and co-workers<sup>4</sup> who added 40 p.p.m. of fluoride to the diet of the parent females during pregnancy and lactation. This work will be discussed later.

The object of this paper is to report an investigation of the possibility of reducing caries in the teeth of rats by administering large quantities of fluoride during that period between the time of completion of calcification of the enamel and the time of eruption.

#### EXPERIMENTAL PROCEDURES.

Black-hooded Norway rats were used as experimental animals. As the first and second molar teeth are most susceptible to caries, both form and erupt at approximately the same age, these teeth only were included in this study.

In an earlier experiment<sup>14</sup> it was found that there was only a slight prevalence of caries in the black-hooded Norway rat when a high-sucrose diet was used, but the inclusion of 8 per cent. coarse cornmeal caused a two-fold increase in the caries rate. An attempt was made to render these animals more susceptible to dental decay by feeding a high-sucrose diet to the mothers during pregnancy and lactation<sup>15</sup>.

Because this strain of rat appeared to have a comparatively high resistance to the development of caries, it was decided not to rely on sucrose alone as a cariogenic agent. Therefore coarse corn meal was fed during the first portion of the experimental period, followed by a diet with a high-sucrose content.

Eight female rats were selected for breeding young rats. From the commencement of mating until the completion of lactation the following diet was used:

Sucrose 50 per cent.  
Wheat germ 25 per cent.  
Oatmeal 6 per cent.  
Peanut Oil 2 per cent.  
Casein 15 per cent.

Sodium chloride 1 per cent.  
Calcium carbonate 1 per cent.  
Riboflavin\* 0.5 milligrams per 100 grams of ration.

Forty young rats were divided into five groups, care being taken to distribute the sexes as evenly as possible and also to distribute the animals from each litter evenly among the groups. This division into groups was carried out on the fifteenth day, which is prior to weaning. The rats for each group were differentiated by observing their markings. At weaning they were sorted out into their correct groups.

#### *Injection of Sodium Fluoride.*

Sodium fluoride was administered parenterally to avoid inaccurate dosage or loss by regurgitation. The groups received the following amounts on the days indicated:

Group 1. No fluoride.

Group 2. Each rat was given 0.24 mg. of fluoride on the 15th day of age.

Group 3. Each rat was given 0.24 mg. of fluoride on each of the 15th, 16th and 17th days of age.

Group 4. Each rat was given 0.12 mg. of fluoride on each of the 15th, 16th and 17th days of age.

Group 5. Each rat received 0.024 mg. of fluoride on each of the 15th, 16th and 17th days of age.

In each case the fluoride was administered parenterally as a solution of sodium fluoride. The daily dosages given to groups 2, 3, 4 and 5 were approximately equivalent to 20, 20, 10 and 2 mg of fluoride per kilogram of body weight respectively.

The period during which the fluoride was administered was dependant upon the dental chronology of the rat. In Wistar rats, enamel formation of the first and second molars is usually completed by the fifteenth day, and they erupt at approximately eighteen and twenty-one days respectively. The eruption times of the Norway rat were similar, as were other developmental factors such as the time of opening of the eyes and the first appearance of hair. Therefore, it was assumed that the chronological development of the enamel would be similar.

As the third molar is not completed until an age of 28 days, it was not included in this study.

\*This ration, apart from the riboflavin supplement, would have supplied approximately 30 to 40 micrograms of riboflavin to each animal daily as about 12 gm. of this diet were consumed per rat each day. McCoy<sup>16</sup> considers that the minimum amount of riboflavin required for a pregnant and lactating rat is 100 micrograms per day.

*Feeding of Caries Producing Diets.*

At twenty-one days all the rats were weaned, placed in their respective groups and fed the following coarse particle diet:

Corn meal (10 to 25 mesh) 67 per cent.  
Wheat germ 18.5 per cent.  
Powdered milk 4 per cent.  
Casein 9 per cent.  
Sodium chloride 1 per cent.  
Calcium carbonate 0.5 per cent.

After eight weeks this ration was changed to a high-sucrose type consisting of:

Sucrose 60 per cent.  
Wheat germ 23.5 per cent.  
Oatmeal 7 per cent.  
Casein 8 per cent.  
Sodium chloride 1 per cent.  
Calcium carbonate 0.5 per cent.

This was fed for 12 weeks.

Twenty weeks after weaning all rats were killed, their jaws were removed and stored in 10 per cent. formalin until the teeth were examined for caries.

*Method used for Detection of Caries.*

The technique used was a modification of that of Cox<sup>4</sup>. Thin layers were ground from the buccal and lingual surfaces of the molar teeth which were then stained with 0.5 per cent. methylene blue and examined with a ten-magnification binocular microscope. The molars were left in the jaw bone and the teeth of each quadrant were ground simultaneously with a fine carborundum disc mounted in a dental handpiece. The exact thickness of tooth removed could not be determined accurately as in the Cox technique, but with a little practice it was found relatively simple to traverse the teeth with eight separate grinding movements, four from the buccal and four from the lingual, of roughly equal extent.

One advantage of this method is that it does not result in the complete destruction of the whole tooth; the final preparation is a ground section through the base of the fissures in which nearly all of the lesions were located.

One disadvantage is that this method is exceedingly slow. However this problem could be largely overcome by traversing the tooth from buccal to lingual by only two grinding operations, that is, one third of the buccolingual dimension would be removed each time. It is felt that this less tedious technique would not result in any significant loss of accuracy.

The carious lesions were placed in classifications according to their size: (1) those lesions in which the dentine was involved to a very slight extent, (2) those in which the dentine was more extensively involved, but the overlying enamel was not markedly broken down, and (3) all grossly carious lesions where the enamel was badly broken down. These lesions were visible to the naked eye.

*RESULTS.*

Before the experiment was completed, two rats in group 2 died on the sixteenth day, one in group 3 on the eighteenth day and one in group 4 on the seventeenth day. It is possible that some of these deaths may have resulted from the toxicity of the sodium fluoride. It has been observed that intraperitoneal injections of 100 mg. per kilogram body-weight of fluoride (as sodium fluoride) can cause a mortality rate of as high as 50 per cent. At a later period three other rats died.

According to Cox<sup>4</sup> there are 28 caries-susceptible regions on the first and second molar teeth of rats. In this experiment 92 per cent. of the total caries count occurred in 10 of these areas: the three transverse fissures of the lower first molar and the two transverse fissures of the lower second molar. When a crown was almost destroyed by caries, it was assumed the lesion had originated in the fissures. Such an assumption is justified in view of the almost complete absence of caries in other sites on teeth not affected by gross caries. About 8 per cent. of lesions occurred in the fissures of the upper molars.

The results are set out in tables 1 and 2. Groups 2 and 5 showed only minor changes in caries prevalence, whilst groups 3 and 4 had 34 per cent. and 24 per cent. less carious lesions than the controls. They also had the smallest lesions but according to the index used this was only to the extent of approximately 20 per cent. However, the prevalence of gross lesions differed markedly: these two groups had 70 per cent. less grossly carious lower first and second molars per rat than the control group and none of their upper molars were grossly affected. It was mainly this factor that caused the variation in the average caries size.

It was interesting to observe the difference in the degree of caries reduction between those areas which were comparatively caries-resistant and those which were more highly susceptible. For this purpose the 28 caries-susceptible sites of the first and second molars were divided into three groups: (i) the three transverse fissures of the lower first molar,

TABLE 1.

| Group      | Number of rats | Date of exposure to fluoride (days after birth) | Amount given per day (mg. per kilo) | No. of carious lesions per rat | Percent reduction in caries incidence | Average index of size of lesions | Percent change in index of size |
|------------|----------------|---|-------------------------------------|--------------------------------|---------------------------------------|----------------------------------|---------------------------------|
| 1. control | 7              | —   | —                                   | 7.1                            | —                                     | 1.8                              | —                               |
| 2.         | 5              | 15th  | 20                                  | 7.6                            | — 7                                   | 1.7                              | — 5                             |
| 3.         | 6              | 15, 16, 17th                                    | 20                                  | 4.7                            | + 34                                  | 1.5                              | — 17                            |
| 4.         | 8              | 15, 16, 17th                                    | 10                                  | 5.4                            | + 24                                  | 1.4                              | — 22                            |
| 5.         | 7              | 15, 16, 17th                                    | 2                                   | 6.6                            | + 7                                   | 2.0                              | + 11                            |

The prevalence and comparative size of carious lesions in rats which had received fluoride for a limited period after the enamel of the first and second molars had formed but before these teeth had erupted.

(ii) the two transverse fissures of the lower second molar, (iii) all other regions combined. In the control group (and also in a previous experiment<sup>14</sup>), caries prevalence in sites "i" and "ii" was approximately equal, but in both sites it was very much greater than in "iii," which, therefore, were presumed to be areas of low caries susceptibility. For the combined groups 3, 4 and 5, it was found that the caries at sites "i," "ii" and "iii" was respectively 13 per cent., 22 per cent. and 55 per cent. less per rat than in the controls.

#### Statistical evaluation.

By applying the "t" test to these results it was found that the caries reductions observed in groups 3 and 4 were not significant, but they were highly suggestive. The probability that the results were not due to chance was 12 to 1 and 7 to 1 respectively.

A higher degree of significance would have been obtained if the statistical analysis had been based on a caries index which had taken the average size of the cavities, as well as their number, into consideration. Under such a system the caries reductions in groups 3 and 4 would have been greater than has been reported here.

#### DISCUSSION.

##### *Theoretical basis of the proposed hypothesis.*

1. *Fluoride absorption by calcified tissues from dilute solutions:* Even when fluoride intake is low the skeletal tissues adsorb it from the blood stream continuously throughout life. For example in London where the domestic water contains a low level of fluoride, its concentration in the bones of elderly persons is approximately ten times that in

TABLE 2.

| Group | Percentage of lower first and second molars with gross caries |
|-------|---|
| 1.    | 21  |
| 2.    | 20  |
| 3.    | 8   |
| 4.    | 5   |
| 5.    | 25  |

The prevalence of grossly carious lower first and second molars.

young children and babies<sup>5</sup>. Thus it might be assumed that the unerupted but calcified enamel surface could adsorb fluoride from the blood.

Two recent investigations indicate that enamel takes up fluoride rapidly from solutions containing only traces of this element. Straub and Adler<sup>6</sup> demonstrated that enamel crushed into coarse granules and exposed to a sodium fluoride solution containing only 10 p.p.m. of fluoride ion, rapidly became saturated with fluoride. The in-vivo experiments of Alder, Straub and Popevics<sup>7</sup> showed that fluoride from solutions containing approximately 20 p.p.m. was rapidly adsorbed by intact erupted enamel surfaces. These two experiments suggest that the surface layers of the unerupted enamel could take up fluoride from the blood, especially if its concentration was raised temporarily by the parenteral administration of very large doses.

2. *Permeability of enamel:* Enamel, especially young enamel, is now usually regarded as a permeable tissue. Wainwright and Lemoine<sup>8</sup> demonstrated that radioactive urea diffused rapidly through intact enamel as well as through the lamellae. However,



there was little or no penetration in teeth which had been erupted for 25 years or more. Using radioactive phosphorus Sognnaes and Shaw<sup>9</sup> showed that the enamel of unerupted teeth was approximately five to ten times more permeable than the enamel of mature teeth. Therefore, it appears probable that the adsorption of fluoride by newly formed enamel may not be a surface reaction only, and that the permeability of enamel may be greatest in newly formed unerupted teeth.

3. *Evidence from water fluoridation experiments.* Three to four years after the commencement of the Newburg-Kingston experiment in U.S.A. there were 53 per cent. less D.M.F. first molars amongst the Newburg children whose ages ranged from three years eight months to four years eight months when fluoridation was begun. Since enamel formation of first molars is completed by the age of three years this caries reduction must have resulted from an exposure to some environment after these teeth had formed. The proportion of this reduction brought about by the post-eruptive effect of the fluoride can be ascertained from the same experiment<sup>10</sup>. The group whose average age was six years two months at the beginning of fluoridation (whose first molars were presumed to have already erupted) had 22 per cent. less D.M.F. first molars than the Kingston group.

The difference between these two figures, that is 53 per cent. and 23 per cent., might be presumed to have been brought about mainly by the post-calcification, but pre-eruptive adsorption of fluoride by the enamel.

4. *Evidence from the comparative caries immunity conferred on the deciduous teeth by the fluoride of the drinking water:* By drinking fluoridated water there is approximately an equal reduction in the caries experience of deciduous and permanent teeth. However, the means by which the deciduous teeth acquired their protective fluoride is open to speculation. Because almost all of their enamel development takes place before birth or during lactation, the placenta or the mammary glands may have transmitted sufficient fluoride to incorporate it in the developing enamel. If this occurred, it seems likely that it might cause some degree of mottling. However, this does not occur even when the drinking water contains 3 p.p.m. of fluoride<sup>11</sup>. Other evidence also indicates that neither the placenta<sup>12</sup> nor the mammary glands<sup>13</sup> readily transmit fluoride.

An alternative explanation would be that the ingestion of fluoridated water by the young child may result in the adsorption of fluoride by the unerupted but calcified enamel.

#### *The Present Experiments.*

There are two particular points of interest in the results reported in this paper. The first is that a considerable reduction in caries prevalence occurred when the rats were given injections of sodium fluoride over a period of some days (groups 3 and 4). The second is that rats receiving only one injection of sodium fluoride (group 2) had a much higher caries prevalence than those (group 4) which received only a slightly higher total amount of sodium fluoride, but had the doses spread over three days.

It must be assumed that the fluoride from the one injection was rapidly removed from the blood stream by renal excretion and skeletal adsorption, thus allowing insufficient time for any significant adsorption by the enamel. However, this does not appear to have been the case when the doses extended over a three-day period. In this regard there is a further point that must be considered. If the fluoride concentration in the bones was raised, the concentration in the blood would not return to its original level immediately after the injections were suspended<sup>17</sup>, as some of the fluoride stored in the bones would be slowly excreted. Therefore the unerupted teeth (especially the second molars which do not erupt until 21 days of age) would have been exposed to an increased amount of fluoride in the tissue fluids for some period after the series of injections had been completed. This effect would be less in the group (group 2) receiving one injection only, than in those receiving a series of injections (groups 3 and 4), because of the presumed lower skeletal adsorption of fluoride in the former group.

When considering the manner in which the teeth acquired their partial protection against caries, the possibility of formed enamel being permeable from the dentinal surface, as well as from the external surface, deserves some consideration<sup>18</sup>. If this can occur (which seems unlikely) the enamel could receive fluoride through the dentine after the injections had ceased. In this regard it might be noted that dentine, especially if recently formed, readily adsorbs fluoride.

It is difficult to understand why the number of gross lesions in groups 3 and 4 was comparatively low whilst there was little change in the other two grades of the size of carious lesions. A probable explanation could be that the adsorption of fluoride by the dentine could be expected to be greatest in groups 3 and 4. This may have resulted in a slowing down of carious lesions when they entered the dentine, with a consequent reduction of gross lesions.

The daily injections given in these experiments (that is 20, 10 and 2 mg. of fluoride per

kilogram of body weight) would be approximately the equivalent of the amount of fluoride per kilogram of bodyweight ingested daily by humans whose drinking water contained 800, 400 and 80 p.p.m. of fluoride respectively. These huge doses were necessary because their administration had to be confined to a period of only three days. If a low level of fluoride, equivalent to that supplied by a drinking water containing only a few parts per million of fluoride had been used, the unerupted teeth probably would not have been exposed for a sufficiently long time to the traces of this element to allow for its adequate adsorption by the enamel.

An indication of the time taken for calcified tissues to adsorb fluoride from the circulatory fluids can be gained from the fact that in four weeks the skeletal system of rats receiving 230 p.p.m. of fluoride in their diet, retained approximately three times the amount that was retained in one week<sup>5</sup>. It can thus be seen what an advantage it would have been if the three day period used in these experiments could have been extended. However, this would have meant using an animal in which the time between the completion of enamel formation and tooth eruption was very much greater than is the case with the rat.

The results of these experiments suggest a different interpretation of the work of Cox<sup>4</sup>, who observed a greater caries resistance in the teeth of the young rats whose mothers had a diet containing 40 p.p.m. of fluoride (as sodium fluoride) during pregnancy and lactation. As the formation of the molar teeth has only just begun at birth, Cox assumed that either sufficient fluoride was secreted in the mothers' milk to cause this change in caries susceptibility of their offspring, or that the young rats had accumulated a store of this element before birth by means of placental transfer. Neither of these assumptions is likely: firstly, very little calcium is laid down in the young rat's body at birth so that the capacity of the foetus to store fluoride is not great. Secondly, the fluoride content of milk is not significantly affected by the mother's fluoride intake<sup>13</sup>, and there is only a small transfer of fluoride through the placenta<sup>12</sup>.

Another interpretation seems possible. Young rats, though not usually weaned until approximately 21 to 24 days of age, begin to eat the mother's diet and to drink water at approximately 16 days of age. Assuming that the rats used by Cox acted in a similar fashion as the black-hooded Norway rats it is likely that the young animals had access to appreciable amounts of fluoride at that period between calcification and eruption, quite apart from that which may have been secreted by the mother's mammary glands.

# SUMMARY.

1. Sodium fluoride was injected daily during the period between the calcification and eruption of the first and second molars of rats. The doses ranged from 2 to 20 milligrams of fluoride per kilogram body weight per day.
2. Coarse corn meal was fed for the first part of the experimental period in order to initiate carious lesions. A high sucrose diet was fed for the remainder of the experiment in order to enlarge these lesions.
3. Caries was detected by grinding thin layers from the buccal and lingual and examining the newly exposed tooth surfaces.
4. The two groups receiving the most fluoride had 34 per cent. and 24 per cent. less caries than the control group. There were 70 per cent. less grossly carious lower first and second molars in these two groups.

# REFERENCES.

1. Miller, B. F.—Inhibition of experimental dental caries in the rat by fluoride and iodoacetic acid: *Proc.Soc.Exper.Biol. & Med.*, 39:389 (June) 1938.
2. McClure, F. J.—Observations on induced caries in rats. Effect of fluoride on rat caries and on composition of rats' teeth: *J.Nut.*, 22:391 (Oct.) 1941.
3. McClure, F. J.—Observations on induced caries in rats. Inhibiting effect of fluoride ingested post-eruptively and prior to the caries producing diet: *J.Dent.Res.*, 22:37 (Feb.) 1943.
4. Cox, G. J., Matuschak, M. C., Dixon, S. F., Dodds, M. L., and Walker, W. E.—Experimental dental caries, IV. Fluorine and its relation to dental caries: *J.Dent.Res.*, 18:481 (Dec.) 1939.
5. Glock, G. E., Lowater, F., and Murray, M.—The retention and elimination of fluoride in bones: *Biochem.J.*, 35:1235 (Dec.) 1941.
6. Straub, J., and Adler, P.—Fluorine saturation rate of human enamel: *J.Dent.Res.*, 28:310 (June) 1949.
7. Adler, P., Straub, J., and Popovics, M.—Intravital uptake of fluorides by the teeth under various conditions: *J.Dent.Res.*, 29:549 (Aug.) 1950.
8. Wainwright, W., and Lemoine, F. A.—Rapid diffuse penetration of intact enamel and dentine by carbon<sup>14</sup> labelled urea: *J.A.D.A.*, 41:135 (Aug.) 1950.
9. Sognnaes, R. F., and Shaw, J. H.—Salivary and pulpal contributions to the radiophosphorus uptake in enamel and dentine: *J.A.D.A.*, 44:489 (May) 1952.
10. Ast, D. B., Finn, S., and McCaffery, J.—Preliminary reports from Newburg-Kingston: *Am.J.Pub. Health*, 40:716 (June) 1950.
11. Mavrogordato, T.—The preventive role of fluoride against caries: *J.Dent.Res.*, 30:225 (April) 1951.
12. Gardner, D. E., Smith, F. A., Hodge, H. C., Overton, D. E., and Feltman, R.—The fluoride content of placental tissue as related to the fluoride content of drinking water: *Science*, 115:208 (Feb. 22) 1952.
13. McClure, F. J.—Fluorine in foods: *Pub.Health Repts.*, 64:1061 (Aug. 26) 1949.
14. Carr, L. M.—The production of caries by sucrose and corn meal: *Austral.J.Dent.*, 58:7 (Feb.) 1954.
15. Sognnaes, R. F.—Caries-conductive effect of a purified diet when fed to rodents during tooth development: *J.A.D.A.*, 37:676 (Dec.) 1948.
16. McCoy, R. H.—The Rat in Laboratory Investigation: J. B. Lippincott Company, 1942: Edited by J. Q. Griffiths and E. J. Ferris, page 67.
17. Largent, E. J., and Heyroth, F. F.—The absorption and excretion of fluorides; III. Further observations on metabolism of fluorides at high levels of intake: *J.Ind.Hyg.Tox.*, 31:134 (May) 1949.
18. Bodecker, C. F.—Concerning the "vitality" of the calcified dental tissues. IV. The vital staining of human dental enamel: *J.Dent.Res.*, 20:377 (Oct.) 1941.

## The Management of Rampant Dental Caries\*

G. N. Davies, D.D.S. (N.Z.)†

### INTRODUCTION.

#### I. Description.

The term rampant caries is used very frequently by dentists to describe a number of different effects of the same disease. Massler and Zwemer<sup>1</sup> define the term as follows:—

Rampant caries is a suddenly appearing, widespread, rapidly burrowing type of caries resulting in early involvement of the pulp and affecting those teeth or dental surfaces usually regarded as immune to ordinary decay.

The most distinguishing character of this type of rampant caries is the fact that the proximal surfaces of lower anterior teeth and the cervical areas of the anterior teeth are affected. An example of such a condition is illustrated in Fig. 1. Rampant enamel caries is characterised by extensive decalcification of the enamel with relatively little destruction of the dentine. Rampant dental caries is characterised by rapid and extensive destruction of dentine with only a slight and localised destruction of enamel. In a recent report from the United States, Massler<sup>2</sup> stated that this form of rampant caries was found in five per cent. of 2,842 children aged 14 to 17 years.

A much more common and distressing form of rampant caries is that which is characterised by a very high rate of development of new lesions. The essential feature is that, in the patient affected, the dentist detects a large number of new cavities at each six-monthly re-examination.

The fact that a patient has a large number of decayed teeth which require fillings or extractions does not necessarily imply that the patient has rampant caries. This condition may be due to an accumulation of untreated lesions and need not be indicative of a very high susceptibility to the disease.

This paper is concerned with the management of the rapid and recurring form of dental caries.

#### II. Magnitude of the problem in New Zealand.

It is, of course, impossible to fix a dividing line which separates precisely a patient with rampant caries (as defined) from a patient with a moderate or high susceptibility to dental caries, although Becks<sup>3</sup> considers that a patient is suffering from rampant caries if he develops ten or more lesions a year. The location of the dividing line will depend on such variable factors as age, the general susceptibility of the population and the ability of dentists to cope with the special requirements of this group.



Fig. 1.—An example of so-called rampant caries.

Table 1 gives an indication of the magnitude of the problem in New Zealand.

If we arbitrarily define a yearly increase of nine or more newly decayed tooth surfaces in pre-school children and primary school children as constituting rampant caries, we see that 35 out of 212, or 16 per cent. of pre-school children are affected and 13 out of 98, or 13 per cent. of school children are affected. Similarly, if we arbitrarily define a yearly increase of 12 or more newly decayed tooth surfaces in High School children and University students as constituting rampant caries we see that 52 out of 339 or 15 per cent. are affected.

#### III. Limitations of conservative work alone.

In general terms there are three alternative methods of treating a patient with rampant caries.

(a) *radical*: treatment by extracting all the remaining teeth. This will result in the prevention of future lesions not by the treatment of the disease but by removal of the tissues affected by the disease.

(b) *conservative*: the treatment of the effects of the disease by the extraction of unsalvageable teeth and the filling of all other teeth.

(c) *conservative and preventive*: treatment of both the cause and the effects of the disease.

In a recent investigation of the dental status of recruits to the compulsory military training

\* Read at the 13th Australian Dental Congress, Brisbane, June, 1953.

† Senior lecturer in Preventive Public Health and Children's Dentistry, University of Otago Dental School, Dunedin, New Zealand.

programme in New Zealand<sup>4</sup>, we found that the type of dental treatment previously received did not affect the caries-attack rate. This fact is obvious to dentists but not to the public.

Routine conservative work does result in a reduced extraction rate for patients with a low or moderate susceptibility to dental caries (Fig. 2) but alone it cannot achieve results of practical significance in the treatment of rampant caries.

#### TREATMENT PLANNING SCHEME.

##### I. Consultation.

Our present knowledge of the aetiology and prevention of dental caries is such that before beginning a conservative and preventive plan of treatment we must be assured of the full co-operation of the adult patient or of the parent of a school or pre-school patient.

An adult patient may not wish to retain his natural teeth for a variety of reasons, such as: "It's too expensive," "False ones look nice and regular," or more frequently, "I've had enough of the 'drill'." Whatever the reason may be, the dentist must first balance the cost to the patient of saving teeth in terms of physical or mental discomfort and money, against the benefits to the health, efficiency, and happiness of the patient.

If, after he has made this evaluation, the dentist decides on a conservative and preventive treatment plan, he must then attempt to convince the patient that this treatment is in the best interests of the patient. At the same time he must give a brief and general outline of what is involved and make it perfectly clear that a successful outcome will be largely dependent upon the patient's full co-operation.

The first step in the treatment plan is thus a consultation at which the dentist makes an accurate assessment of two things:—

- (a) The patient's interest in retaining his natural teeth, and
- (b) the ability and willingness of the patient to follow the dentist's advice and instruction.

If the co-operation of the patient is in doubt or unobtainable the logical procedure is to follow a radical treatment plan.

If the patient immediately signifies his willingness to co-operate, or if full co-operation has been achieved after the dentist has discussed the problem with the patient, then the logical procedure is to follow a conservative and preventive treatment plan.

##### II. Conservative and preventive treatment.

Both the dentist and the patient have responsibilities in this plan. The patient must undertake conscientious home treatment in accordance with the dentist's instructions.

The treatment of the effects of the disease, that is to say, the treatment of existing lesions is the sole responsibility of the dentist. Responsibility for the treatment of the cause of the disease is shared by both dentist and patient.

##### (a) Treatment of the effects of the disease:

All active carious lesions should be brought under control at the earliest opportunity. When a large number of open lesions are present one or, at the most, two appointments should be spent in removing caries and placing dressings of accelerated zinc oxide. When this

TABLE 1.

| GROUP  | Number of Children Examined | Newly decayed surfaces per year |     |     |      |       |       |       |     | Mean Increase per child per year |
|--|-----------------------------|---------------------------------|-----|-----|------|-------|-------|-------|-----|----------------------------------|
|  |                             | 0-2                             | 3-5 | 6-8 | 9-11 | 12-14 | 15-17 | 18-20 | 20- |                                  |
| Pre-School Children                          | 212                         | 92                              | 40  | 45  | 20   | 9     | 5     | 1     | —   | 4.4                              |
| Primary School Children                      | 98                          | 38                              | 26  | 21  | 7    | 6     | —     | —     | —   | 4.3                              |
| High School Children and University Students | 339                         | 70                              | 94  | 85  | 38   | 24    | 17    | 6     | 5   | 6.6                              |

Distribution of newly decayed tooth surfaces in a sample of New Zealanders.

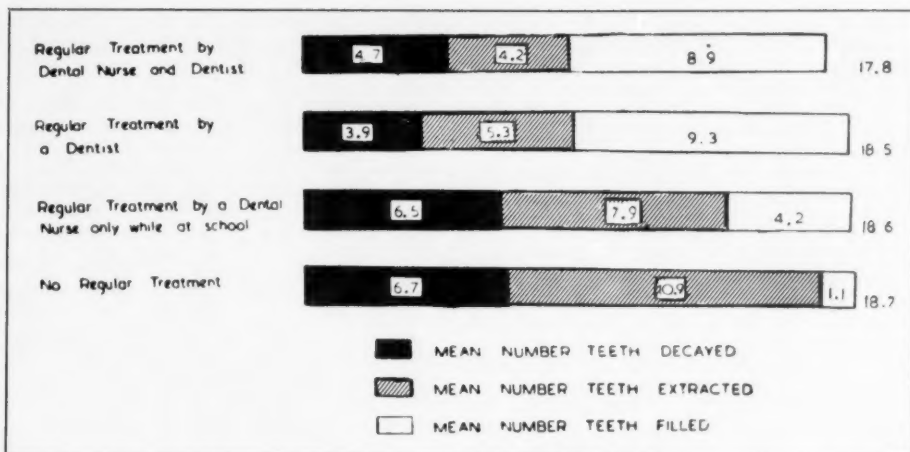


Fig. 2.—Previous treatment and dental caries experience among New Zealand Military Training Recruits (18-21 years of age).

step has been completed a start can be made with proper cavity preparations, and permanent restorations.

Teeth with peri-apical or pulp involvement should be extracted. Pulp therapy should be undertaken only if the prognosis is particularly good.

Following the extractions, consideration should be given to the use of space-retainers for pre-school and school children and bridges or metal partial dentures for adolescents and adults. As a general rule bridges and partial dentures should not be placed until the dentist is satisfied that the disease (rampant caries) has been satisfactorily controlled.

(b) *Treatment of the cause of the disease:*

The prevention of a disease implies that the cause has been removed or nullified. Because of the limitations of our knowledge of its histopathology, treatment of the cause of rampant dental caries must be largely empirical.

Although the role of acid in the initiation and progress of dental caries is not completely understood we do know that decalcification of tooth substance is a very important contributing factor.

There are two essentials for acid production in the mouth—a suitable substrate and a suitable enzyme system. Of all measures for the prevention of caries which have produced clinically favourable results the majority affect one or both of these essential factors.

Refined carbohydrates constitute a suitable substrate; oral bacteria provide the suitable enzyme system.

#### DIETARY ANALYSIS.

A dietary analysis and saliva tests are an essential part of any treatment plan for the prevention of rampant caries.

A dietary analysis makes it possible to determine the nature and quantity of the substrate. Lactobacillus counts and Snyder's tests enable us to determine the nature of the enzymes present (i.e., the acidogenic capacity of saliva).

The simplest type is a qualitative diet analysis (Fig. 4). This may be carried out very quickly. From it, sufficiently comprehensive information can be obtained to enable the dentist to undertake replacement diet therapy. The procedure is as follows:—

(a) The parent or patient is given an instruction sheet and a series of blank diet charts.

(b) On the diet charts the parent or patient enters a description and the quantity of all food and drink consumed each day. This list should include everything taken between meals as well as at the main meals of each day.

(c) When the completed diet sheets are returned the dentist compares the amounts of each food eaten with the quantities recommended for a person of the patient's age.

(d) From the results of this analysis the dentist can quickly see which foods require to be decreased and which should be increased.

A more complex and time-consuming method is a quantitative diet analysis (Fig. 5). In this procedure the diet is analysed in



terms of the daily intake of each individual nutrient—protein, fat, carbohydrate, calcium, phosphorus, iron, vitamin A, thiamin, riboflavin, nicotinic acid, ascorbic acid and vitamin D. This is made possible by comparing the intake of each portion of food with tables of food values. This type of analysis should precede the prescription of a low carbohydrate diet.

#### SALIVA TESTS.

When adequate facilities are available Lactobacillus counts and Snyder's tests should be done. Lactobacillus counts require expensive equipment and can only be carried out by persons with some bacteriological training. Snyder's test is much simpler to carry out, requires no special training and involves very little equipment. Grossman<sup>3</sup> has suggested the use of a simple thermos flask in place of an expensive thermostatically controlled incubator:

A mercury thermometer is placed through the centre of the cork stopper and sealed securely. Water is poured into a plaster bowl and regulated to a temperature of about 43 deg. C. as determined by the thermometer. The water is now poured into the thermos bottle until it is about half full. The stopper is replaced and the thermos bottle is shaken several times so that the inner surface of the container will take up the warmth of the water. When the thermometer reads 38 deg. C. this improvised incubator is ready to receive the culture tubes. Each tube is suspended in the water by a piece of dental floss securely tied around its top. The ends of the floss are left hanging out of the thermos bottle and are held securely in place by the cork stopper when it is replaced in the bottle.

#### DIET THERAPY.

The following methods have been advocated for the dietary control of dental caries:

1. Restriction of free sugars and refined carbohydrates.
2. Elimination of "in-between" meals.
3. A balanced diet.
4. A prescribed low carbohydrate diet.

#### 1. Restriction of free sugars and refined carbohydrates.

(a) *Rationale:* i. A reduction in the number of acidogenic bacteria in saliva can be obtained by reducing an excessive intake of free sugar and refined carbohydrates such as sweets, biscuits, cakes and white bread<sup>6</sup>.

ii. This reduction of refined carbohydrates results not only in a reduction in the number of acidogenic bacteria, and hence in the concentration of the suitable enzyme system, but also reduces the quantity of the substrate or material from which acid is formed.

iii. The combination of these two factors results in a decreased incidence of active dental caries.

(b) *Indications and limitations:* This form of therapy is theoretically practicable at any age but adults and adolescents who can understand the problem are generally more co-operative than young children. For effective patient participation it is essential to make definite suggestions as to how refined foods may be replaced. This necessitates a diet analysis as an essential pre-requisite, for it is only by this means that we can obtain an appreciation of the patient's present dietary status.

(c) *Procedure:* A four-day record of the patient's diet is analysed qualitatively in the manner indicated. From this analysis the dentist makes positive recommendations to the parents and/or the patient and indicates which foods in the daily diet should be increased and which should be decreased.

(d) *Evaluation of success or failure:* Two methods of evaluation can be employed:

i. *Bacteriological* — using Lactobacillus Counts and Snyder's Colormetric Tests.

ii. *Clinical*—in which the dentist compares the increment of new cavities after the diet therapy with the increment over the same period of time prior to diet therapy.

The bacteriological tests, like many other biological special tests, are not completely reliable. Nevertheless, they do give a reasonably accurate result and can be used both to predict future caries activity and to estimate the patient's tolerance of refined carbohydrates. For example: in approximately 80 per cent. of cases, a high Lactobacillus count (over say 40,000 Lactobacilli per ml. of saliva) indicates that the patient will develop new cavities in the near future. A patient with rampant caries will nearly always show a very high Lactobacillus count and a strongly positive Snyder's test. If the tests are retaken at frequent intervals following the dietary change, a lowered Lactobacillus count and a negative or weakly positive Snyder's test should result. If the patient's Lactobacillus count and Snyder's test result remain low over a period of time, the patient may be permitted to take a restricted amount of refined carbohydrate, such as bread. Then if susceptibility tests are retaken at intervals it should be possible, eventually, to determine the level of refined carbohydrate intake which causes a sudden increase in the number of acid-forming bacteria in the saliva. Thereafter, provided the intake of refined carbohydrate is restricted to an amount below this tolerance level, the patient should have a maximum of benefit conferred.



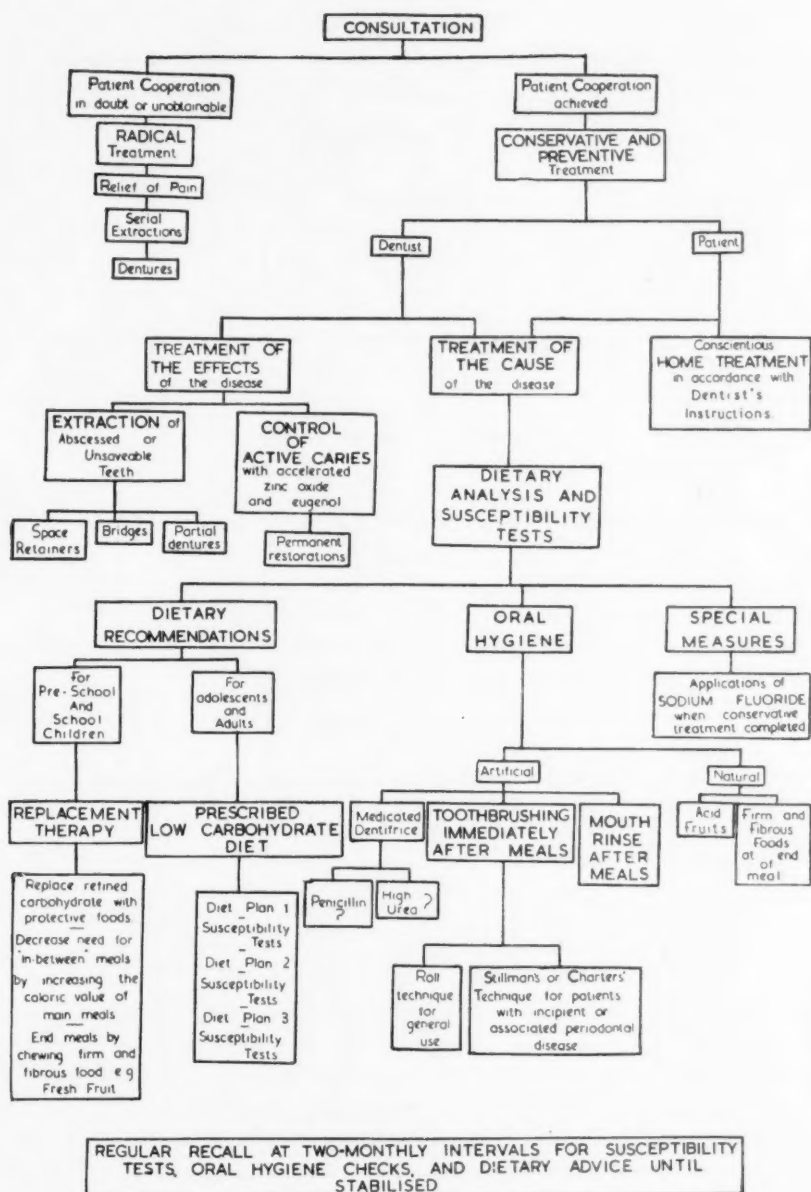


Fig. 3.—A treatment plan for patients with rampant caries.

## QUALITATIVE DIET ANALYSIS.

| Recommended Daily Allowances<br>of Food for New Zealanders                             |   |   |   | Patient's Name .....  | FOODS IN DIET |   |   |   | DAY |  |  |  |
|--|---|---|---|---|---------------|---|---|---|-----|--|--|--|
|  | 2-5<br>Years                              | 5-14<br>Years   | Adults                                    |   | 1             | 2 | 3 | 4 |     |  |  |  |
| Milk<br>(Scalded or<br>pasteurized)  | 1 $\frac{1}{2}$ -1 $\frac{1}{2}$<br>pints | 1 $\frac{1}{2}$<br>pints  | 1<br>pint                                 | Milk: As a drink<br>With tea etc  |               |   |   |   |     |  |  |  |
| Eggs.<br>As a substitute 1<br>for meat or<br>fish.                                     | 1   | 1   | 1 or<br>3-5 per<br>week.                  | Eggs: Number  |               |   |   |   |     |  |  |  |
| Cheese   | Small<br>serv-<br>ing.                    | 1- $\frac{1}{4}$ ozs<br>as an<br>altern-<br>ative to<br>meat or<br>fish | 1<br>small<br>cube                        | Cheese: Servings  |               |   |   |   |     |  |  |  |
| Meat, fish,<br>liver, brains,<br>tripe, rabbit,<br>chicken,<br>sweetbreads,<br>kidney. | 1 oz.                                     | 1- $\frac{1}{4}$ ozs<br>or<br>cheese<br>as alter-<br>native.            | 3<br>ozs.                                 | Meat: Servings<br>Liver: Servings<br>Fish: Servings<br>Other: Servings  |               |   |   |   |     |  |  |  |
| Green or<br>yellow<br>leafy<br>vegetables  | 1- $\frac{1}{2}$<br>ozs                   | 3-8 ozs   | 9<br>ozs                                  | Green or<br>yellow<br>vegetable: Servings   |               |   |   |   |     |  |  |  |
| Fruit  | Raw at<br>least<br>once<br>plus<br>stewed | Raw at<br>least<br>once plus<br>stewed or<br>dried                      | Raw at<br>least<br>once<br>plus<br>stewed | Fruit: Raw citrus<br>raw, other<br>Stewed, servings   |               |   |   |   |     |  |  |  |
| Potato or<br>other root<br>vegetables  | 1- $\frac{1}{4}$<br>ozs                   | 5-10<br>ozs   | 10 ozs                                    | Potato: Servings<br>Other<br>root veg.: Servings  |               |   |   |   |     |  |  |  |
| Butter and<br>other fats   | $\frac{1}{2}$ -1 oz                       | 1- $\frac{1}{4}$ ozs  | $\frac{1}{2}$ ozs                         | Butter: Servings<br>Other fat: Servings   |               |   |   |   |     |  |  |  |
| Bread: at least<br>half the day's<br>supply should<br>be wholemeal                     | 2-4<br>ozs                                | 4-8<br>ozs  | 8 ozs                                     | White bread: Slices<br>Brown bread: Slices<br>Wholemeal: Slices   |               |   |   |   |     |  |  |  |
| Unrefined<br>cereal:<br>(Oatmeal,<br>rolled oats,<br>whole wheat)                      | 2-2 oz                                    | 2-4 ozs   | 4 ozs                                     | Refined<br>cereal: Servings<br>Unrefined<br>cereal: Servings  |               |   |   |   |     |  |  |  |
| Cod Liver<br>Oil   | 1-2<br>teasp.                             | 1<br>teasp.   | -   | Cod Liver<br>Oil: Servings<br>Substitute: Servings  |               |   |   |   |     |  |  |  |
| Sugar: NOT<br>MORE THAN  |   | $\frac{1}{2}$ -2<br>ozs   | 2 ozs                                     | Sugar: Servings<br>Sweets: Number<br>Cake: Servings<br>Biscuits: Servings<br>Jams, honey: Servings<br>Dessert: Servings |               |   |   |   |     |  |  |  |
| RECOMMENDATIONS:   |   |   |   |   |               |   |   |   |     |  |  |  |
|  |   |   |   |   |               |   |   |   |     |  |  |  |
|  |   |   |   |   |               |   |   |   |     |  |  |  |
|  |   |   |   |   |               |   |   |   |     |  |  |  |

Fig. 4.—A sample form used for obtaining a qualitative analysis of the diet.

DAILY DIET CHART.

NAME ..... AGE ..... WEIGHT .....

STUDENT ..... CHART NUMBER ..... DATE .....

| FOODS                             | Port<br>ions | Total<br>Calo-<br>ries | Calories |     |      | Ca<br>gm | P<br>gm | Fe<br>mgm |  |  | Vit<br>A | Vit<br>B1 | Vit<br>B2 | Vit<br>C | Vit<br>D |
|-----------------------------------|--------------|------------------------|----------|-----|------|----------|---------|-----------|--|--|----------|-----------|-----------|----------|----------|
|                                   |              |                        | Prot     | Fat | Carb |          |         |           |  |  | I.U.     | mgm       | mgm       | mgm      | I.U.     |
| <u>MORNING</u>                    |              |                        |          |     |      |          |         |           |  |  |          |           |           |          |          |
| <u>AFTERNOON</u>                  |              |                        |          |     |      |          |         |           |  |  |          |           |           |          |          |
| <u>EVENING</u>                    |              |                        |          |     |      |          |         |           |  |  |          |           |           |          |          |
| <u>NIGHT</u>                      |              |                        |          |     |      |          |         |           |  |  |          |           |           |          |          |
| <u>TOTAL</u>                      |              |                        |          |     |      |          |         |           |  |  |          |           |           |          |          |
| <u>AVERAGE<br/>3 DAYS</u>         |              |                        |          |     |      |          |         |           |  |  |          |           |           |          |          |
| <u>RECOMMENDED<br/>ALLOWANCES</u> |              |                        |          |     |      |          |         |           |  |  |          |           |           |          |          |

Fig. 5.—A sample form used for obtaining a quantitative analysis of the diet.

(e) *Evidence of the effectiveness of this procedure:* Becks, Jensen and Millarr<sup>7</sup> claim that in 1004 of 1228 rampant dental caries cases, a reduction of *Lactobacillus acidophilus* counts was obtained within a period of a few weeks by reducing the intake of refined carbohydrates and that this reduction in the *Lactobacillus* count was followed by a drastic decrease in new caries. In a group of 790 rampant caries cases (ten or more new cavities in the preceding year), the prevention of new cavities was achieved along with the reduction of the *Lactobacillus* count in 80 per cent. of cases. Caries was arrested completely in 62.3 per cent. of patients and an additional 17.7 per cent. developed only one or two cavities during the following year.

Becks<sup>3</sup> recommends that patients should remain on a diet low in refined carbohydrate for at least three months.

## II. Elimination of "in-between" meals.

(a) *Rationale:* i. Since decalcification of enamel is caused by acids formed from carbohydrate, it would seem logical that the rate of progress of the lesions would be roughly dependent upon the intake of fermentable substances.

ii. Stephan<sup>8</sup> in his studies of the pH on enamel surfaces following a glucose rinse, found that acid is formed within a few minutes and that the acid is dissipated within about an hour.

iii. Thus it follows that, in the mouth of a person who is susceptible to dental caries, the more frequently fermentable carbohydrates are taken, the greater will be the number of times that the enamel is subjected to the decalcifying effect of acid.

### (b) *Practical considerations and limitations:*

The principle of a positive approach applies just as it does for the restriction of refined carbohydrates. Young active children have a fairly high energy requirement. If a child is given only a cup of tea, a piece of hot buttered toast and a chocolate biscuit for breakfast it will feel genuinely hungry by mid-morning. All of these foods are digested and absorbed quickly, consequently the stomach is emptied quickly. The natural response to an empty stomach is hunger. What could be more natural than the child spending its pocket money on that confectionery masterpiece—an "all-day sucker." This may be taken at 10 or 11 a.m. and may last the child until mid-day. At lunch time, however, we find that the child's appetite has been temporarily assuaged and it does not feel like eating a

large lunch—jam sandwiches and a meat pie are therefore deemed a satisfactory repast. By mid-afternoon, however, the sandwiches and meat pie have passed through the stomach, and the child is again hungry, so it calls for new satisfactions. A brightly-coloured bottle of "fizz" and a chocolate biscuit meet this requirement satisfactorily. At tea time, however, the child is again coaxed or otherwise persuaded to attempt a solid meal of meat, green vegetables and a dessert of nutritious foods. The afternoon biscuit and the remaining portion of the morning "all-day sucker" have, however, taken the edge off the child's appetite and there just isn't any room for mother's carefully prepared meal. But by bed-time the child is again ravenously hungry and must have another biscuit before bed so that it can wake up in the morning with one more cavity to be filled.

Now this state of affairs, though slightly exaggerated, does commonly occur. The cure does not lie in merely telling the parent or child or both to cut out "in-between" meals eating; rather should the parent be advised to prepare a large breakfast and to include in this meal a fair proportion of fatty foods such as bacon, eggs, cheese and butter. Fat delays gastric emptying, so the child should have a "satisfied" feeling for a longer period of time and should not have such an urgent need for energy foods in between.

(c) *Evidence of the effectiveness of this procedure:* There is at present no evidence which indicates the effectiveness of this procedure alone in the control of dental caries. One cannot ascribe the low incidence of dental caries among primitive peoples solely to the fact that they have only two or at the most three meals per day. The nature of their normal dietary is probably the main determining factor, although the restricted number of meals may be an important contributory factor.

## III. An adequate and balanced diet.

We must not forget that any diet which we prescribe must be nutritionally adequate as well as protective from the viewpoint of dental disease.

Howe, White and Elliott<sup>9</sup> of the Forsyth Dental Infirmary in Boston, U.S.A., have reported the beneficial effects of nutritional supervision on the status of general health and dental health. In their dietary programme the nutritionist is concerned, not with one or two practices, but with the dietary as a whole. Emphasis is given to the increased consumption of protective foods rather than any single food factor. They claim that, in a two-year period, the average decrease in new cavities for all age groups was 56 per cent. (Fig. 6).

It is now generally agreed that refined carbohydrates are associated with rampant dental caries and particularly with rampant enamel caries. Because of this fact the principle of prescribing a balanced diet for the control of dental caries has been strongly criticised by the environmentalists. What the environmentalists overlook, however, is that a diet is not well-balanced if it contains an excess of refined carbohydrate.

In reality, therefore, the views of advocates of an adequate and well-balanced diet and those of the environmentalists may not be as radically different as they would at first appear.

There can surely be no objection from the environmentalists if we ensure that an adequate diet prescribed by a dentist does not contain excessive amounts of refined carbohydrate.

I believe we could get the agreement of both nutritionists and environmentalists if we would undertake a form of dietary control which I have called replacement therapy. I believe this is the logical treatment for patients in the pre-school and school age groups. Essentially this treatment ensures that a patient will consume an adequate and well-balanced diet, so designed as to reduce to a minimum its content of refined or processed carbohydrate.

In addition to this, I am convinced that in general, parents who feed their children large amounts of refined carbohydrate definitely need some instruction in simple dietetics. To

advise a patient or parent to "cut out the sweets" is a negative approach. You must also suggest ways and means of replacing the calories supplied by the sweets and other refined or fermentable carbohydrates. With the co-operation of the parents this objective can be achieved by replacement therapy.

#### IV. Prescribed low carbohydrate diet.

(a) *Rationale*: i. Since acidogenic bacteria flourish in a carbohydrate medium, any procedure which restricts carbohydrate from the environment of the teeth will, in effect, reduce the number of acid-forming bacteria.

ii. By restricting the intake of carbohydrate the substrate, or material from which acid is formed, will also be reduced.

iii. The combination of these two factors favours a reduced incidence of dental caries.

(b) *Indications*: For co-operative patients presenting with rampant dental caries and a high Lactobacillus count. In my view this form of therapy is suitable for adults and adolescents but not for young children.

(c) *General description of the procedure*: If a series of susceptibility tests shows a consistently high Lactobacillus count, or a strongly positive Snyder's test, the patient is placed on a diet in which the actual amount of carbohydrate is restricted to approximately

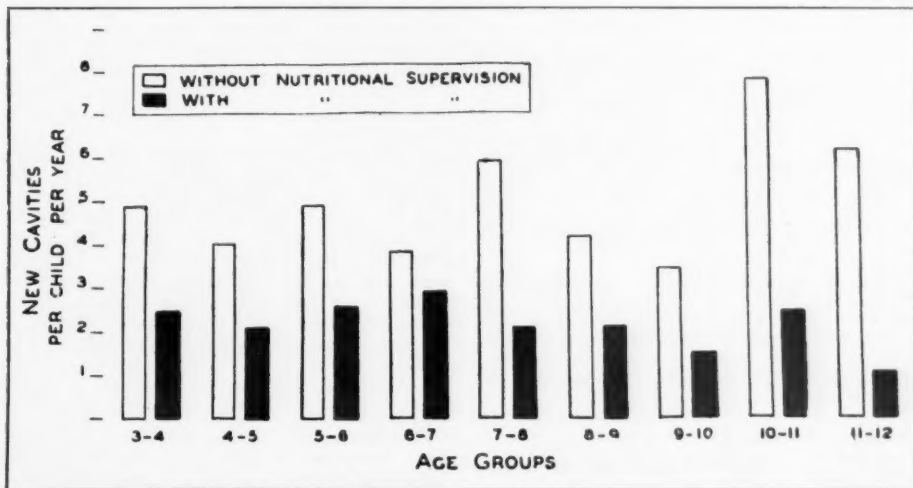


Fig. 6.—Effect of nutritional supervision upon incidence of dental caries.

(Reprinted from data of Howe, White and Elliott<sup>9</sup>).

100 grams daily. The number of calories required is estimated from the results of a dietary analysis and the age, weight, sex and activity of the patient. This diet, diet plan 1, is maintained for a period of two weeks. At the end of this time susceptibility tests are repeated and if the *Lactobacillus* count remains low the patient is permitted to include wholemeal bread, potatoes and some carbohydrate-containing fruit and vegetables in limited quantity. This is called diet plan 2, and is maintained for a two weeks period. Susceptibility tests are repeated but this time the patient remains on diet plan 2 until the results of the tests are known. If the *Lactobacillus* count remains low the patient proceeds to diet plan 3. This is diet plan 2 plus the addition of sugar at one meal during the day. This sugar is taken with a main meal, not in-between meals. The patient follows diet plan 3 for a further two weeks period, at the end of which time, susceptibility tests are repeated. If the *Lactobacillus* count is still low after diet plan 3 the patient is permitted to return to an unrestricted diet. Susceptibility tests are repeated at frequent intervals to ensure that the state of low susceptibility is maintained. If the count shows a tendency to return to its previous high level the patient may be advised to return to diet plan 2 for a short period of time.

(d) *Evidence of the effectiveness of this procedure:* Jay<sup>10</sup> in a study of 809 patients found that *Lactobacillus* counts were reduced significantly in approximately 80 per cent. of cases.

#### ORAL HYGIENE.

Although oral hygiene is the oldest method of controlling dental caries its reputed value has been, and still is, the subject of much controversy.

The various methods of oral hygiene may be classified as follows:—

##### I. Artificial methods.

- (a) Toothbrushing using a non-medicated dentifrice.
- (b) Toothbrushing using a medicated dentifrice.
- (c) Vigorous mouth rinsing.
- (d) Miscellaneous aids — toothpowder and floss silk.

##### II. Natural methods.

- (a) The inclusion of firm, fibrous (detergent) foods in the diet (Sim Wallace<sup>11</sup>).
- (b) The use of acid fruits at the end of a meal (Pickerill<sup>12</sup>).

In this paper I shall discuss only toothbrushing and mouth rinsing.

##### I.(a) Oral hygiene using a non-medicated dentifrice.

(i) *Rationale:* Toothbrushing is advocated in order to remove the fermentable substrate before it is converted to acid, or to remove the acid before it can damage the tooth surface.

(ii) *Methods and time factor:* Stephan<sup>8</sup> has demonstrated that, in the mouth of a patient susceptible to dental caries, acid is formed within a few minutes of eating fermentable carbohydrate. Thus, if toothbrushing is to be effective in reducing dental caries incidence it must be practised immediately after meals.

A patient with rampant dental caries needs to be advised not only of the proper time to carry out oral hygiene but should also be given precise instructions concerning the method of brushing.

The methods of Stillman<sup>13</sup> and Charters<sup>13</sup> advocated by periodontists are excellent for patients with incipient or associated periodontal disease. Both techniques are, however, difficult to master and unsuitable for pre-school and young school children.

The "scrubbing brush" method probably does more harm than good. The simple roll technique advocated by Hine<sup>13</sup> and others while far from ideal is reasonably effective and probably the easiest for patients to follow.

(iii) *The effectiveness and limitations of this procedure:* In a large experiment Fosdick<sup>14</sup> found that toothbrushing with a non-medicated dentifrice immediately after meals reduced the incidence of dental caries by approximately 50 per cent. However, the effectiveness of oral hygiene in reducing pit and fissure caries and interproximal caries is not established.

Conscientious toothbrushing alone is certainly inadequate for the treatment of the cause of rampant dental caries. It is also of little value for pre-school children for they do not have the manual dexterity to use a brush efficiently. Despite this, however, it is very much worthwhile encouraging a child to use a toothbrush after every meal in order to establish a desirable dental health habit. The child can be taught the correct method when he is older.

##### I.(b) The use of medicated dentifrices.

(i) *Rationale:* Medicated dentifrices have been advocated in an attempt to change the nature of the oral enzyme systems by altering the bacterial ecology of the mouth (Ammonium-ion) or by inactivating the micro-organisms which produce them (Penicillin).



(ii) *Penicillin*. The use of a dentifrice containing penicillin has been advocated as a preventive measure for patients with rampant caries. In 1950, following the publication of the successful results of Zander<sup>15</sup>, the Council of Dental Therapeutics of the American Dental Association<sup>16</sup> recommended that its use be restricted to cases of rampant caries and that it should only be distributed on a prescription basis.

Since 1950 other experiments with a penicillin dentifrice have not confirmed the successful results of Zander<sup>17, 18</sup>. The indiscriminate use of small doses of antibiotics, including penicillin, has also fallen into disfavor.

In October, 1952, the Council on Dental Therapeutics<sup>19</sup> published a second report on the status of penicillin dentifrices. In this report they stated *inter alia* that:

Because of:—

- (a) The contradictory nature of the evidence for the therapeutic usefulness of penicillin dentifrices when employed with or without supervision, and
- (b) The tendency for the development of a higher percentage of micro-organisms resistant to 0.5 units or more of penicillin per cubic centimetre in the mouths of those using the penicillin dentifrices, the Council on Dental Therapeutics concludes that:

On the basis of available evidence, penicillin dentifrices should not be distributed at the present time except on a prescription basis. Qualified individuals or institutions should continue to conduct further investigations concerning the therapeutic usefulness and safety of antibiotic dentifrices.

Although many of the acidogenic bacteria commonly found in saliva are penicillin-sensitive, the dangers inherent in the use of such a dentifrice need to be carefully considered, namely the possibility of sensitizing the patient to penicillin, the development of penicillin-resistant micro-organisms in those using the dentifrice, and the possibility of altering the ecology of the mouth to the detriment of the patient, e.g., by promoting a secondary overgrowth of *Candida albicans* which is not penicillin-sensitive.

(iii) *Urea-dibasic ammonium phosphate*: Recently in the New York State Dental Journal<sup>20</sup>, the author reviewed the status of ammonium-ion dentifrices. From the results of his own investigations with a low urea toothpowder and after a consideration of other research work with both high and low urea dentifrices he came to the conclusion that, while high urea dentifrices appear to be more promising in the control of dental caries, final proof of the effectiveness of ammoniated dentifrices had not been established.

On the basis of current evidence, experimental results do not justify any extravagant claims. The results of Henschel and Lieber's work<sup>21</sup> with a high urea dentifrice are en-

couraging but do not establish that high urea dentifrices will reduce caries in the general population.

In short, no special medicated dentifrice has yet been devised which will ensure an effective result in cases of rampant caries.

#### I.(c) *Vigorous mouth-rinsing immediately after meals.*

Fosdick<sup>14</sup> has advocated this procedure as an alternative to immediate post-prandial toothbrushing. In a most interesting monograph Lundquist of Sweden<sup>22</sup> presented the results of his experiments on the rate of sugar-clearance from the mouth. He found that a high concentration of sugar in saliva in conjunction with a prolonged sugar-clearance time was associated with high caries activity. By testing a large number of common foods he found that candy, honey and sweetened breads possess the "highest caries potentiality." After testing the effect on sugar-clearance time of rinsing the mouth with water, he concluded that to be effective the rinsing must be vigorous and that:

more than one rinse is required immediately after eating for the complete elimination of sugar from the mouth.

He recommends rinsing the mouth with water after all meals and after any between-meal consumption.

#### SPECIAL MEASURES.

##### I. *Sodium fluoride.*

(a) *Action*: although the exact mechanism of the action of fluorides is not completely known they are thought to reduce the incidence of dental caries either by inactivating enzymes located on a tooth surface or by making the tooth surface resistant to acid attack.

(b) *Systemic administration*: ionizable salts of fluorine may be administered systemically in water or in the form of tablets. At present there is a considerable volume of evidence indicating the effectiveness of water-borne sodium fluoride but experiments with sodium fluoride in tablet form have been neither numerous nor well-conducted. Regardless of the form in which fluorides are administered, systemic therapy is of little or no value in controlling rampant caries since systemic fluorides only affect teeth which are in the process of development at the time of administration.

(c) *Topical application*: on the other hand the application of 2 per cent. sodium fluoride to the crowns of recently erupted teeth is both logical and worthwhile. Sufficient evidence is available<sup>23, 24, 25</sup> to show that this procedure

results in approximately a 40 per cent. reduction of new carious lesions when large groups of children are considered.

(d) *Limitations*: this therapy is, however, subject to certain definite limitations:

i. Massler<sup>26</sup> has shown that not all teeth can be successfully fluoridated.

Knutson and Scholz<sup>27</sup> state that:

A series of four applications reduces dental caries incidence approximately 40 per cent. and that all children treated benefit to this extent.

This result has not been achieved by other workers<sup>28</sup>. The consensus of opinion at present is that we cannot guarantee a successful result for each individual child. Neither can we determine which type of child is likely to benefit most, although Hewat, Eastcott and Leslie<sup>28</sup> claim that topical sodium fluoride is most effective for patients with a very high susceptibility to dental caries.

ii. It is generally accepted that the technique is most effective when applied to recently erupted teeth. Knutson<sup>29</sup> recommends the ages of three, seven, ten and thirteen years as being the most generally suitable for its use. Bibby<sup>25</sup> considers that an essential factor for a successful result is the application of the solution to a clean and dry tooth surface. Experiments in which sodium fluoride was applied to the teeth of adults have met with varying success<sup>30, 31</sup>.

iii. The technique is simple but time consuming, Sandler<sup>32</sup> has drawn attention to the economic limitations of the present technique and emphasises the fact that fluoride therapy is "an adjunct to and not a substitute for dental treatment."

(e) *Practical application*: topical applications of sodium fluoride should be carried out as a routine measure for all children with rampant caries but only after all active lesions have been controlled by permanent restorations. The parent should be informed that a substantial reduction in new cavities cannot be guaranteed but that experiments have shown that a 40 per cent. reduction has been obtained when sodium fluoride was applied to the teeth of large numbers of young children.

#### REGULAR RECALL APPOINTMENTS.

When all necessary conservative treatment has been completed the patient should be recalled at short and regular intervals so that the dentist may help the patient with any difficulties experienced with home treatment measures, check the effectiveness of the

patient's oral hygiene and observe any changes in caries activity by regular Lactobacillus counts or Snyder's tests.

#### SUMMARY.

Rampant dental caries is an acute manifestation of a disease which can exist in a number of different forms. The management of the type of rampant caries characterised by a very high rate of development of new lesions is discussed in this paper.

In a small sample of New Zealanders rampant caries was found in approximately 16 per cent. of pre-school children, 13 per cent. of school children and 15 per cent. of high school and university students.

Evidence is presented to show that regular conservative work alone will reduce the extraction rate for patients with a low or moderate susceptibility to dental caries but will not achieve results of practical significance in the treatment of rampant caries.

In advising a treatment plan consideration must first be given to that form of therapy which is in the best general interests of the patient and to the willingness of the patient to co-operate in following any advice and instruction given.

If a full patient co-operation is unobtainable a radical treatment plan should be followed. If, on the other hand, the patient or parent is prepared to take an active part in treating himself a conservative and preventive treatment plan should be followed. In this plan both dentist and patient attempt to treat both the cause and the effects of the disease.

Because of our limited knowledge of its histopathology the treatment of the cause of rampant caries is largely empirical and restricted to diet therapy (replacement therapy for pre-school and young school children and a low carbohydrate diet for adolescents and adults), oral hygiene and topical applications of sodium fluoride.

The rationale, method, effectiveness, and scope of each alternative form of treatment are discussed and a treatment-planning scheme is described in detail.

#### REFERENCES.

1. Massler, M., and Zwemer, J. D.—Rampant caries—its clinical management: D.Digest, 58:546 (Dec.) 1952.
2. Massler, M.—Prevalence of rampant caries in teenage children: J.D.Res., 28:674 (Dec.) 1949.
3. Becks, H.—Nutrition as applied to the practice of dentistry, Faculty of Dentistry, University of Toronto, 1952.
4. Davies, G. N.—Studies on dental caries in New Zealand. II. Dental caries experience and treatment requirements of compulsory military training recruits: New Zealand D.J., 49:92 (April) 1953.

5. Grossman, L. I.—Root canal therapy: 3rd ed., Philadelphia, Lea and Febiger, 1950.
6. Beck, H.—The physical consistency of food and refined carbohydrate restrictions—their effect on caries: from Easlick, K.A.: Dental Caries, St. Louis, C. V. Mosby Co. 1948. Pages 187-192.
7. Beck, H., Jensen, A. L., and Millarr, C. B.—Rampant dental caries: Prevention and prognosis: J.A.D.A., 31:1189 (Sept.) 1944.
8. Stephan, R. M.—Intra-Oral Hydrogen-Ion Concentrations associated with dental caries activity: J.D. Res., 23:257 (Aug.) 1944.
9. Howe, P. R., White, R. L., and Elliott, M. D.—The influence of nutritional supervision on dental caries: J.A.D.A., 29:38 (Jan.) 1942.
10. Jay, P.—The reduction of oral lactobacillus acidophilus counts by the periodic restriction of carbohydrate: Am.J.Orthodont. and Oral Surg., 33:162 (Mar.) 1947.
11. Wallace, J. S.—The newer knowledge of hygiene in diet: New York Dental Items of Interest Pub. Co. Inc., 1952.
12. Pickerill, H. P.—Prevention of dental caries and oral sepsis, London, Bailliere Tindall and Cox, 1912.
13. Hine, M. K.—The use of the toothbrush in the treatment of periodontitis: J.A.D.A., 41:158 (Aug.) 1950.
14. Fosdick, L. S.—The reduction in the incidence of dental caries. I. Immediate toothbrushing with a neutral dentifrice: J.A.D.A., 40:133 (Feb.) 1950.
15. Zander, H. A.—Effect of a penicillin dentifrice on caries incidence in school children: J.A.D.A., 40:569 (May) 1950.
16. Council on Dental Therapeutics.—Council issues preliminary report on penicillin dentifrice: J.A.D.A., 40:619 (May) 1950.
17. Hill, T. J., and Kniesner, A. H.—Penicillin dentifrice and dental caries experience in children: J.D.Res., 28:263 (June) 1949.
18. Walsh, J. P., and Smart, R. S.—Clinical trial of a penicillin tooth powder: New Zealand D.J., 47:118 (July) 1951.
19. Council on Dental Therapeutics.—Council reports on current status of penicillin dentifrices: J.A.D.A., 45:466 (Oct.) 1952.
20. Davies, G. N.—Ammoniated dentifrices and caries control: New York D.J., 19:19 (Jan.) 1953.
21. Henschel, C. J., and Lieber, L.—High urea ammoniated dentifrice—caries reduction through four year's home use: Oral Surg., Oral Med. and Oral Path., 5:155 (Feb.) 1952.
22. Lundquist, C.—Oral sugar clearance: Odont. Revy, 3: suppl. 1, 1952.
23. Knutson, J. W., and Scholz, G. C.—The effect of topically applied fluorides on dental caries experience: New York J.Den., 20:72 (Feb.) 1950.
24. Mojs-Petersen, V.—Topical application of sodium fluoride: J.Canad.D.A., 17:213 (April) 1951.
25. Bibby, B. G.—Topical treatments of the teeth as a means of preventing dental decay: D.J. Australia, 22:596 (Dec.) 1950.
26. Massler, M., Tapia, C., and Zwemer, E.—Action of acid on topically fluoridised intact enamel surfaces: J.D.Res., 30:515 (Aug.) 1951.
27. Knutson, J. W., and Scholz, G. C.—The effect of topically applied fluorides on dental caries experience: U.S. Public Health Rep., 64 (Nov.) 1949.
28. Hewat, R. E. T., Eastcott, D. F., and Leslie, G. H.—Control of dental caries by topical applications of sodium fluoride: New Zealand D.J., 47:123 (July) 1951.
29. Knutson, J. W.—Sodium fluoride solutions: technic for application to the teeth: J.A.D.A., 36:37 (Jan.) 1948.
30. Klinkenberg, E., and Bibby, B. G.—The effect of topical applications of fluorides on dental caries in young adults: J.D.Res., 29:4 (Feb.) 1950.
31. Marshall-Day, C. D.—Effect of topical sodium fluoride on dental caries during adolescence: J.D.Res., 30:514 (Aug.) 1951.
32. Sandler, H. C.—Fluorine therapy in caries control: New York D.J., 15:160 (March) 1949.

## Labio-Lingual Appliances in Present-Day Orthodontic Treatment\*

*Oren A. Oliver, L.L.D., D.D.S.;  
Boyd W. Tarpley, B.A., D.D.S.;  
Harold K. Terry, B.S., D.M.D.;  
and William H. Oliver, D.M.D.*

This paper discusses and advocates labio-lingual arch therapy. The following expressions of opinion are not our own but are the compiled, correlated opinions of many of the accomplished users of the labio-lingual technique.

Of course, all of us well realise that mechanical therapy is not the sole factor when considering orthodontic problems. So that we will not be duly criticized for dwelling so completely upon appliances, let us immediately, willingly admit that the biologic factors which make tooth movement possible is of equal importance to the mechanical factors which accomplish this movement. The fundamental purpose of orthodontic treatment is to restore the living teeth to an individual, normal functional and esthetic position. This is not ideally or physiologically accomplished by severe, intermittent pushing, pulling, and rotating of these vital organisms, but by a gentle, stimulating pressure which treats each tooth as the individual living organism that it is.

The authors do not believe it is desired that they dwell in detail on the biologic aspects of orthodontic treatment, nor is it at all necessary to do so, for all capable orthodontists certainly well know and understand these biological principles, regardless of the type of appliances they use. But do we know and understand the biological effects of the particular appliance we use, and are we positive that their reaction is in keeping with proved biological principles? It is high time we stopped matching mechanics against the biological and match mechanics with the biological. Hellman stated recently:

In my estimation, an appliance to be least harmful must, to begin with, exert slight effects upon vital tissues. Then it must also allow time between those periods of effective action, so as to enable the tissues to regenerate. Then also, the fact should be heeded that an appliance accomplished more and does less harm during periods of normal active growth and differentiation than during periods of rest. To my knowledge little attention to such details is given in practice.

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We would like to quote also Dr. Albin Oppenheim. His remarks are as follows:

In the use of strong forces the periodontal membrane becomes crushed and its nourishment facilities cut down. As a consequence, undermining resorption sets in from various sides but not only in the direction of the intended movement. The resorption (loss) of bone is therefore limited. The osteoclasts on the periosteal side appear already after twenty-four hours, possibly even earlier. For both these osteoclasts we propose the name 'secondary osteoclasts.' They persist until the affected bone, cementum, and the crushed tissues are eliminated. In the use of strong forces, many vessels are ruptured on the traction side, forming haemorrhages. The corresponding impairment of the nourishment of the bone with the inevitable encroachment on the osteocytes, as well as the toxins originated by the decomposition of the red blood corpuscles, mobilize osteoclasts to work on the traction side too. This contributes to the looseness of the teeth. For these osteoclasts originating under quite strange conditions we propose the name 'tertiary osteoclasts'.

On the pressure side, on account of impaired nourishment by the total compression and thrombosis of the vessels, the osteocytes and cementum corpuscles disintegrate and finally disappear. Structures deprived of their living elements are dead tissues, and sooner or later nature has to dispose of them. To avoid all these occurrences, we have so far only one means, that is to avoid a too great or too long protracted compression of the membrane.

The stronger the force used, the greater the probability for a quick and forceful relapse. One reason for these relapses may also be too wide periodontal space at the traction side by the nondevelopment of osteoid and still enhanced by the action of osteoclasts.

My histologic evidence would seem to prove the points:

1. That the application of light forces is correct and preferable in orthodontics.

2. Our work should be performed so as to give nature ample time for compensatory formation of osteophytes. For the same reason the osteoid on the traction side is laid down in an even layer and is of greater thickness. By the reduction of the width of the periodontal membrane and on account of the greater resistance of osteoid to resorption, the extent of an always possible relapse is greatly limited.

3. Only light forces are able to produce an abundance of the primary osteoclasts, which alone can be considered our real helpers. They alone work without creating too great damage, if any at all. These primary osteoclasts are the principal factor in bringing about all the marvelous and revolutionary changes without clouding the prospects for the future.

Freely, we admit that today the labio-lingual technique is not absolutely ideal; it certainly is not universal or automatic, nor even absolutely physiologically applied in all cases. In present-day orthodontics, there is no appliance known and used which in all respects can be scientifically classed as universal, nor is there any appliance when placed that can do the thinking, adjusting, or prove automatic in its application. And, as all well realize, today we have no basis for determining what is absolutely physiological for each individual. Therefore, no one should claim any appliance to be universal, automatic, or absolutely physiological in action. What we claim for the labio-lingual technique is that it is the most ideal appliance to use, and can be made to produce the closest to individual physiological activity of any technique known to the science of orthodontics today. The advocates

of the labio-lingual technique feel that it, more closely than any other, approaches the classic standards of the ideal appliance, which are:

Stability and durability.

Ease of construction, placing and manipulation.

Cleanliness, comfort and inconspicuousness.

and, of course, most important of all, efficiency.

*Stability of attachment* is necessary so as to have dependable resistance in the anchor regions which will capably resist the force necessary to move the malposed teeth or arches. *Durability*, or lack of breakage, loose bands, etc., is very necessary to assure proper progress and comfort. These appliances are stable and durable throughout active treatment, and yet do not sacrifice the other important requirements of an ideal orthodontic appliance.

We must accept the fact that simplicity of design, as well as neatness of a compact appliance with a minimum number of bands, is the proper solution to *ease of construction, placing, and manipulation*. The minimum number of bands required, the ease with which the trained operator can construct the basic labial and lingual arches, and the ease with which he can also add and change auxiliary attachments as they are needed and indicated, ranks the labio-lingual technique above all others we now have. These factors save considerable chair time for both patient and operator.

From a social and economic standpoint the therapy here advocated offers numerous advantages. Simplicity of construction, ease of adjustments, adaptability to change, and relatively long periods between adjustments, are all factors which condition the cost of orthodontic service.

The above-mentioned factors of simplicity of design and minimum number of bands aid greatly in maintenance of proper *oral hygiene*. The normal factors of oral hygiene, which are salivary flow and tongue activity, act together to make the lingual appliance the most hygienic that can be used.

Even when the labial arch is used, oral hygiene can be splendid, due to the lack of multiple attachment bands and the fact that the labial arch is rarely in contact with the labial or buccal surface of any except the six anterior teeth. This contact with the six anterior teeth is a type contact which permits cleansing above, below, and even beneath the labial arch. The simplicity of design of the labial and lingual arches makes it possible to completely remove these appliances at each

visit for prophylaxis, if it is necessary, without involving considerable time and discomfort to either patient or operator. These factors are most important in every case, and even more so in cases in which incidence of caries is such that advisability of orthodontic assistance might be questionable.

The factor of *comfort and inconspicuousness* is one which is of great concern to the patient. If we have it, and we do with the labio-lingual technique, the mental attitude of our patients toward their treatment is much better and we can obtain much more complete co-operation. The fact that tooth movement is usually accomplished by gently acting auxiliary attachments is greatly responsible for the comfort of the labio-lingual technique. An additional element of comfort is, of course, the neat, compact type of appliance. Being inconspicuous as they are, they are less likely to create lip habits which often result from the endeavour of the patient to conceal unsightly appliances.

The writers are well aware that of all the requirements of an ideal appliance, *efficiency* is most important. It is not denied that there are other appliances equally as good mechanically, but let us remember there is a decided difference between an excellent mechanical appliance and an orthodontic appliance, the difference obviously being that the activity of an orthodontic appliance must be in keeping with biological principles and produce as closely as possible physiological activity. It must be one that has complete control of all activating pressure so that at all times it will be possible to exert the required amount of pressure in the proper areas and in the proper direction. The labio-lingual technique utilizes appliances that are so adaptable that you are assured of this type of activity. One of its greatest advantages is the fact that it is not a single appliance, but rather a group of appliances, each one individually designed to accomplish the desired result of the individual case.

In the treatment of each individual case there are certain basic types of development and tooth movement which are necessary. These basic developments and tooth movements which are most commonly needed are: lateral development, vertical development, for correction both of open-bites and close-bites; anterior developments of the maxillary and mandibular arches; retraction of the mandible; anterior movement of the mandible; retraction of the maxillary anterior segment; distal movement of the posterior teeth and individual tooth movement, such as rotation, elongation, and depression. All these basic movements can be handled with the labio-lingual arch technique and, because of its

versatility, the operator can be in the process of correcting several different abnormalities simultaneously. Because of this, active treatment periods are reduced, for it is possible to overlap the retention of one abnormality over the treatment of a more resistant one. Yet each tooth involved in each particular abnormality is treated as an individual organism.

As is well known, there are two types of orthodontic pressure. One is constant and the other intermittent. There has been in the past considerable discussion as to which type of pressure is most physiological. Some of our outstanding research men claim the intermittent pressure to be most in keeping with biological principles. There are an equal number, however, who favour continuous pressure, if it is gentle, stimulating pressure and not excessive. A review of the opinions of both of these groups convinces one that both types of pressure are needed and are indicated in orthodontic therapy.

There are certain indications in which intermittent pressure is definitely desirable, but on the other hand, there are also indications where constant pressure is equally as definitely called for.

Since there are definite indications for both constant and intermittent pressure, no appliance can be classified as efficient unless it can capably produce both of these types of pressure. The users of the labio-lingual technique have the decided advantages of having at their command both constant and intermittent pressure. In fact, we can apply constant pressure to certain teeth or segments, while at the same time in the same or opposing arch, we can apply intermittent pressure to individual teeth or segments.

Just as there are two types of orthodontic pressure, there are also two types of orthodontic treatment. Some men have classified them as "fast" treatment or "slow" treatment. This is, however, quite incorrect. There is no such thing as a fast tooth-moving appliance or a slow tooth-moving appliance. The rapidity of tooth movement is in direct proportion to pressure applied and the ability of the organism to react to this pressure. A more scientific classification of the types of orthodontic treatment is to consider them to be either continuous or intermittent. Continuous orthodontic treatment is that in which treatment for the case is carried from beginning to completion in one stage. There are no rest periods. There is no advantage taken of natural growth and development. It is purely a mechanical procedure, the teeth being moved toward supposedly more normal positions by a definite mechanical pressure.



This is the type of orthodontic treatment considered to be necessary in patients in their teens who have completed most of their normal facial growth and development and have present the complete permanent dentition. This type of orthodontic treatment is entirely corrective, since it is applied too late for orthodontics to aid in the prevention of a developing malocclusion. With the labio-lingual technique we can render this type of treatment as capably and more physiologically than with any other.

In the past this type of treatment was the most common because it was then the accepted opinion that no case of malocclusion should be treated until the completion of the permanent dentition. Today we are greatly embarrassed to realize how very wrong we were. We all realize today that often the prognosis for treatment of a teen-age patient with a completed permanent dentition is none too favourable. This being accepted, one school of thought has returned to the extraction of premolar teeth in these underdeveloped arches to obtain space to more esthetically align the anterior segments. It is not our intent to criticize extraction, for in some of these cases compromise procedure is the only way out. What we do oppose is the opinion that the full potentialities of growth and development cannot be stimulated by orthodontic therapy and that treatment should be delayed until the completion of the permanent dentition, at which time it is so often necessary to sacrifice these premolars. It is believed that the full potentialities of growth and development can be stimulated by the labio-lingual technique and that by so doing many of these compromise cases can be prevented.

Intermittent treatment has a definite place in orthodontic therapy. In fact, we must realize that it is by this approach that our greatest progress in orthodontic therapy is probably to be made. Let us approach this problem from a common-sense standpoint. When we notice a definite malocclusion in the mixed or even in the complete deciduous dentition, we know that this case will continue to proceed along the lines of abnormal development because the existing malocclusion presents definite inhibitory factors to normal development. This being true, is it not wise to treat this case immediately, the fundamental purpose being to remove the inhibitory factor and allow the development to continue normally?

In the deciduous dentition there are certain definite indications for orthodontic treatment. Among them are: definite cross-bite, either unilateral or bilateral; cases in which we find the maxillary anterior teeth in lingual version to the lowers and cases in which there are

extremely narrow arches and a decided dist-occlusion. These types of cases, we know, have no possible chance of improvement through natural growth tendencies, but rather are conditions which will get progressively worse and will interfere greatly with nature's attempt at normal development. The labio-lingual technique offers a satisfactory solution to such problems.

These indications and others should definitely receive their initial stage of treatment in the mixed dentition if first noticed there.

When we speak of treatment of this type of case, we do not refer to definite positive tooth positioning to a supposedly pre-determined ideal arch form, or even to an arch form which we think is best for that particular individual. Rather, we refer to treatment that is a stimulus and a director of segments of arches or of complete arches or of individual teeth into paths of normal growth. We refer to treatment which allows individual teeth to assume their normal position as various inhibitory factors are removed. This action can take place with the labio-lingual technique because the individual teeth are not held firmly or rigidly enough to interfere with normal individual tooth movement.

We refer to treatment that does not interfere with normal individual movement of each tooth during the process of mastication, but rather allows normal functional stimulation to the surrounding tissues, thus maintaining at all times normal tissue tone. We refer to treatment in which appliances are used at intervals throughout the patient's natural growth periods, producing changes at the same time when they can and should be produced, with frequent periods during which appliances are removed in order to allow natural adaptation of the tissues to the new positions of the teeth. With this type of treatment, not only are we correcting a definite malocclusion which existed at an early age, but we have also prevented that existing malocclusion from interfering with normal growth and development, and have thus prevented it from becoming progressively more complicated. If we fail to take advantage of intermittent treatment of deciduous and mixed denture cases, we refuse to approach the ultimate goal of all medicine and dentistry, which is prevention.

Anchorage in orthodontics is of utmost importance. It is defined by Webster as "a secure hold sufficient to resist a heavy pull." Since we are dealing with living and constantly changing tissues there can be no "secure hold," therefore anchorage is better defined as a relative resistance to an applied force. When dealing with this subject one must realise the many factors involved. Anchorage and stability are successfully employed in the



labio-lingual technique. Too often papers are so engrossed in theory that they lightly skip over the very elementary but essential steps in practical application. Molar band construction is certainly fundamental and necessary, and yet discouragingly few seem to be masters of this art. Poorly fitting bands are insecure attachments and may be compared to a foundation under a house built on loose sand without stability. They may also produce hyperemia from irritation and thereby reduce anchorage.

Since principal attachment is usually made to the first permanent molar teeth, these are often referred to as the "anchor" teeth. This is a misnomer since these molars are merely a component part of total anchorage. The bands should be individually constructed so that they will always rest in one position alone when finally seated.

The half round tube should be approximately centred mesiodistally on the lingual surface of the tooth parallel to the long axis of the tooth. The round buccal tube should be at right angles to the long axis of the tooth. This positioning of these tubes will give best resistance to forces or torque or leverage from any direction.

The lingual arch appliance as used in our offices is of semi-rigid material and may be likened to a battleship which is the stable platform for the guns which do the desired work even as auxiliary springs accomplish the desired movement of dental units. Nearly all platform bases are constructed with four supports for best stability with least bulk. The lingual arch appliance should be constructed in a similar over-all design rather than an outline similar to that of a horseshoe. The bends should be rounded right angle bends usually in the cuspid region. As many dental units as possible should be contacted to increase anchorage and stability. Occlusogingivally the arch wire should be in a single plane in order to neutralize torque effectively.

A labial arch should always be used with a lingual arch. It is used to reinforce anchorage and also to control movement of the anterior dental units. Again the importance of placement of tubes for maintaining co-linear and co-axial balance is emphasised. The labial arch usually contacts only the incisor and cuspid teeth so that allowance will be made for individual tooth movement and lateral growth and development. This is just as true when using the twin wire labial arch as when using the round labial arch.

Careful basic fabrication of the aforementioned units in the labio-lingual technique is the most important and usually the most

abused or misunderstood part of successful treatment with these appliances. Auxiliary springs and activation of allied component parts of these appliances vary with each individual case and thus cannot be discussed at this time.

The success of any orthodontic appliance is dependent upon its correct usage and fabrication in accordance with the particular purposes for which it was designed. Failures of appliances may usually be attributed to: misunderstanding of construction, ideas that they are simple and foolproof, or changes made for supposed improvement, which absolutely defeat the original purpose for which they were designed.

We feel that we have digressed from our subject by discussing briefly treatment of deciduous and mixed denture cases, but we believe that the greatest service orthodontic treatment can render is probably in the treatment of these cases. We feel that an outstanding point of efficiency of the labio-lingual technique is the manner in which it lends itself ideally to such cases. It is difficult to visualize appliances which positively dictate the direction and extent of tooth movement as being used in deciduous and mixed denture cases, for these appliances are most difficult to keep under absolute control and in harmony with biological and physiological principles, even in the treatment of complete permanent dentitions.

We should always adapt therapeutics to biological fact and make every effort to use appliances that will do what is needed and, at the same time, be safe and dependable in their application to vital, growing tissue. We should prefer always to use appliances that are capable of assisting, supplementing and guiding the developmental tendencies of the individual case, for we are not qualified to predetermine arch form consistently with inherent growth in every case.

We cannot dispute the statement made several years ago by Woodberry:

In the long run nature takes charge of every case.

So why try to take the case completely out of the hands of nature to begin with? Nor can we dispute the statement of Mershon:

We can mechanically move teeth where we think they belong, but nature will move them to where they best adapt themselves to the rest of the organism.

Therefore, why not let the entire organism be an assisting factor in the original positioning of teeth. These things we do with the labio-lingual technique. In many opinions the statements of these two men are but reminders that we cannot expect permanency of

result if we ignore the basic forces of occlusion and retention.

Our specialty has suffered greatly from swinging in a pendulum-like manner from one treatment method to another. One often admires the application of, and end result gained by, the use of a certain appliance by a particular individual, but too often finds that other practitioners cannot get the same results with it. Years of experience in trial and error diagnosis accompanied by natural inherent personal capacities have gone into one orthodontist's services in contrast to another's. There seems to be no principle, however, in the labio-lingual technique which cannot be generalized to all conscientious orthodontists.

In summarizing, let us say that those of us who use the labial and lingual appliances, with their numerous auxiliary spring attachments, and the occlusal guide plane, do so because we believe that they, more than any other appliance, approach the classic standards of the ideal appliance, which are:

- Stability and durability
- Ease of construction
- Ease of placing and manipulation
- Cleanliness
- Comfort
- Inconspicuousness
- Efficiency

We believe in their efficiency because we can obtain any basic tooth movement and feel that we can do so more physiologically than with any other type of appliance. In addition to individual tooth movement, we can stimulate and direct the growth of entire segments or complete arches and do this more physiologically than with any other appliance. We are able to produce either constant or intermittent pressure, whichever is indicated in any particular instance. We can treat completed permanent dentitions as capably as with any other appliance, and we have a decided advantage in the treatment of deciduous and mixed denture cases.

We feel that a great advantage of the labio-lingual technique is that we do not have rigid, fixed attachments to the many teeth, promoting unknown directional changes in the applied force. We believe that all our treatment procedures approach more closely than any other to being physiological and in keeping with proved biological principles, at all times working with and not against natural growth and developmental tendencies or the six basic forces of occlusion.

#### BIBLIOGRAPHY.

- Anderson, G. M.—Practical orthodontics, ed. 7, St. Louis, The C. V. Mosby Company, 1948.
- Dewey, M.—The lingual arch in combination with the labial with extensions, as used by Dr. Lloyd S. Lourie: *Int.J.Ortho.*, 2:593, 1916.
- Dewey, M.—The use of the lingual arch in the treatment of malocclusion as used by Dr. Lloyd S. Lourie: *Int.J.Ortho.*, 2:648, 1916.
- Eby, J. D.—The evolution of the principles of appliances: *Int.J.Ortho.*, 2:184, 1916.
- Eby, J. D., DeVries, B. G., and Spencer, P. G.—(Symposium) What are the possibilities and limitations of orthodontic treatment?: *Int.J.Ortho.*, 19:117, 128, 144, 1933.
- Editorial—The efficiency of the lingual arch as a regulating appliance: *Int.J.Ortho.*, 3:238, 1917.
- Editorial—The removable lingual wire with finger springs: *Int.J.Ortho.*, 4:622, 1918.
- Editorial—*Int.J.Ortho.*, 4:38, 1918.
- Farrar, J. N.—Irregularities of the teeth and their correction: volume 2, London and New York, International News Company, 1888.
- Gifford, A. C.—The possibilities of the lingual and labial arch—single or in combination: *Int.J.Ortho.*, 4:173, 1918.
- Hoffman, A., Porter, L. J., and Jones, E. G.—What may be considered rational methods of Orthodontic therapy: *Int.J.Ortho.*, 19:223, 242, 269, 1933.
- Irish, R. E.—Conscious constructive application of pressure: *Int.J.Ortho.*, 6:528, 1927.
- Johnson, A. LeRoy: The law of occlusion and the normal in orthodontia: *Int.J.Ortho.*, 4:588, 1918.
- Lourie, L. S.—Personal communication, June 3, 1938.
- Mershon, J. V.—Band and lingual arch technic: *Int.J.Ortho.*, 3:195, 1917.
- Mershon, J. V.—The removable lingual arch as an appliance for the treatment of malocclusion of the teeth: *Int.J.Ortho.*, 4:578, 1918.
- Oliver, O. A.—The technic of the lingual and labial arches: *Int.J.Ortho.*, 15:527, 1929.
- Oliver, O. A.—Facial impressions and casts: *Int.J.Ortho.*, 3:204, 1917.
- Oliver, O. A.—The evil effect of adenoids and tonsils upon the dental arches: *Int.J.Ortho.*, 4:391, 1918.
- Oliver, O. A.—President's address, Southern Society of Orthodontists: *Int.J.Ortho.*, 10:203, 1924.
- Oliver, O. A.—Mechanics versus the biologic: *Int.J.Ortho.*, 18:15, 1932.
- Oliver, O. A., Wood, C. R.—Principles involved in the lingual and labial arch with auxiliary attachments: *Int.J.Ortho.*, 18:478, 1932.
- Oliver, O. A.—A report of cases treated by use of lingual, labial appliances and guide plane, *Ibid.* 18:1131, 1932.
- Oliver, O. A.—Some biological and physiological considerations of orthodontia and their relation to some of its mechanical aspects: *Int.J.Ortho.*, 12:132, 1926.
- Oliver, O. A.—President's address, The American Society of Orthodontists: *Int.J.Ortho.*, 16:683, 1930.
- Oliver, O. A., Irish, R. E., and Wood, C. R.—Labio-lingual technic, St. Louis, The C. V. Mosby Co., 1940.
- Oliver, O. A.—Certain limitations in the use of appliances in orthodontia: *Int.J.Ortho.*, 9:265, 1923.
- Oliver, O. A.—Lingual arch in orthodontic therapy: *Am.J.Orthodont. and Oral Surg.*, 25:20 (Jan.) 1939.
- Oppenheim, A.—A possibility for physiologic orthodontic movement: *Am.J.Orthodont. and Oral Surg.*, 30:277 (June), 345 (July) 1944.
- Pullen, H. A.—Anchorage principles in modern orthodontia: *Int.J.Ortho.*, 5:495, 1919.
- Robinson, R. D.—A system of positive and painless tooth movement: *Int.J.Ortho.*, 1:497, 1915.
- Weinberger, B. W.—Orthodontics, and historical review of its origin and evolution, Vols. 1 and 2, St. Louis, The C. V. Mosby Co., 1926.

## Editorial

This journal is published by the Australian Dental Association (New South Wales Branch), B.M.A. House, 135 Macquarie Street, Sydney. Communications concerning literary matter should be addressed to the Editor and all advertising and business matters directed to the Secretary.

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Original communications: Manuscripts should be typewritten on one side of the paper only, with double spacing and liberal margins. Carbon copies should not be sent. References should be placed at the end of the article and should include, in the order given, name of author, title, journal, volume, initial page of article, month and year; e.g., Wallace, J. S.—The newer knowledge of hygiene in diet: *Dent. Items Int.*, 69:38 (Jan.) 1947. References to books should include the following information: name of author, title, edition, place of publication, name of publishers, year and page (if necessary).

Illustrations: These should be kept to a minimum. Suitable captions with number and author's name should be marked on the back of all illustrations. Photographic prints should be approximately 5 in. x 4 in. and printed on glossy paper. Authors unaccustomed to preparing drawings and photographic prints for reproduction are invited to seek the advice of the Editor.

## Teething Powders

The healing professions have often been criticised as being loath to accept popular nostrums and methods of treatment. Occasionally, but rarely, such criticism may be warranted but there are far more occasions when the public has been protected, at least against wasting money and sometimes against putting their trust in useless or dangerous drugs, for often these remedies are either the outward expression of some untrained person's dreams or mere money spinners based on no scientific background at all.

It seems to be a quaint characteristic of man that, whenever his health or bodily comfort is affected, he seeks amongst the exotic and unknown rather than the common sense for a cure. In our enlightened age the use of witchcraft, spells and herbs has been ousted and instead one looks to the multitudinous variety of pseudo-scientific patent medicines to fill the bill.

It is all too easy dispassionately to condemn such action but one can readily understand the attitude of mind of an afflicted person for whom medical knowledge has been unable to contribute any assistance. However there seems to be little excuse for those who refuse either to allow nature to take its course unhindered when a satisfactory end result is anticipated, or to indulge in some treatment after they have been warned against it by the professional advisors.

No one will deny that the process of teething in young children is accompanied by quite distressing symptoms such as a raised tem-

perature, rashes, general irritability, dribbling and, above all, loud nocturnal protestations. However, as the outcome is invariably only the eruption of the teeth and as it is usually the parent's constitution which is more likely to be upset rather than the child's—it is usual for dental advisors to suggest a policy of affectionate forbearance. This is poor consolation to the worried and sleepless parent who thus becomes only too ready to listen to the stories of spectacular successes obtained by various married sisters, mothers and grandmothers. It is not long before the child suffers the added discomfort of frequent bowel movements brought about by liberal doses of "teething powders."

Such a story would seem of little importance were it not for the fact that a death was recently recorded in South Australia, the cause of which was said to have been due to an over indulgence of teething powders. Further, it would appear from recent reports published in the *British Medical Journal* that such powders, because of their mercury content, may play a major aetiological role in pink disease and acrodynia—diseases which can lead to extreme illness or death of the child. So serious is this matter that some makers of teething powders in the United Kingdom have indicated their intention of omitting calomel from their products, whilst one Australian firm has discontinued its production.

There is little that the dental profession can do in this matter beyond impressing upon their patients the grave risks involved should they decide "to do something" for their unhappy, but normal baby.

## Dental Materials

### Current Notes No. 25\*

#### CUTTING INSTRUMENTS.

In recent years there has been quite an upsurge of interest in the design and performance of dental cutting instruments. The work of Walsh and Symmons in New Zealand is well known. They carried out investigations into the use, at very high speeds, of diamond instruments, stones and burs and the effect on cutting efficiency and the perception of vibration. Peyton and his colleagues at the University of Michigan have studied the performance of burs in relation to cutting efficiency, vibration and generation of heat, and Lammie, of the University of Birmingham, has published several papers on tungsten carbide burs. In their recent review and discussion of the use of modern cutting instruments at high speeds, Ingraham and Tanner<sup>1</sup> summarise much of the work of these investigators.

The subject of burs was prominent in the Materials Group sessions of the last general meeting of the International Association for Dental Research. Abstracts of these may be found in the October, 1953, number of *Journal of Dental Research* and full copies on microfilm are available on loan from the Bureau of Dental Standards. In the first paper, Strader described the various steps in the manufacture of steel burs and gave details of the steel used, the dimensions and machineability characteristics. The various types of equipment and the hardening and finishing of the burs were discussed. Henry and Peyton reported a preliminary study of the relation between design and cutting efficiency of steel and tungsten carbide burs. An attempt was made to correlate the cutting efficiency with the angles of the blade and the percentage clearance space. By placing a thermocouple in the head of the bur, Hudson studied the behaviour of steel and tungsten carbide burs at speeds up to 24,000 r.p.m. His results indicate that temperatures well above the limit of tolerance of tooth tissues are attained by the cutting bur.

Continuing with the papers presented at the Materials Group sessions, Hartley investigated the cutting efficiency and vibration production of diamond abrasive cutting instruments at speeds varying from 3,500 to 15,000 r.p.m. Using the cathode ray oscilloscope he found the amplitude and frequency of vibration to be functions of eccentricity and speed of

rotation, respectively. There was considerable variation in the behaviour of diamond instruments from different manufacturers. Jelinek and co-workers studied the effect of design on the cutting efficiency of the dental burs and described an apparatus for determining the relative cutting efficiency under varied conditions of speed and feed. Finally, Nelsen and Pelander gave details of an hydraulic turbine contra-angle handpiece. The turbine is driven by water pumped by a  $\frac{1}{2}$  h.p. motor through nylon tubing and it is claimed that by this means a system relatively free of vibration is obtained.

In a later detailed report<sup>2</sup> it is stated that, while milling cutters of current design do not function well in the hydraulic handpiece, grinding tools such as silicon carbide and diamond points and discs cut with exceptional efficiency.

Work at the Bureau of Dental Standards on the cutting efficiency of burs has been hampered by lack of a suitable test material. The ideal material would be very similar to tooth enamel and of sufficient dimensions and uniformity to allow rates of cutting to be determined with accuracy. At present, rolled brass, of a hardness similar to dentine, and glass microscope slides have been used, but both are far from ideal. Brass, in fact, is too ductile a material to use as a test material for the cutting efficiency of dental burs, and the design of burs for optimum cutting of brass will be different from that required for the hard tissues of the tooth. It has been found at the Bureau that for burs of a particular size and type, hardness of the head is not necessarily a satisfactory criterion of the cutting efficiency. Other factors, such as the design of the blades and the metallographic condition of the bur, must therefore play an important part and these factors are being studied.

Street<sup>3</sup>, from another point of view, has studied the effect of various instruments on enamel walls. He found that the sandpaper disc produced the smoothest-finish surface, and carborundum and diamond discs left quite prominent grooves. Fissure burs did not nick the enamel nearly as much as mounted carborundum stones. His experience did not confirm the hypothesis that a smooth surface on the enamel wall of the cavity can be produced using sharp chisels.

#### REFERENCES.

1. Ingraham, R., and Tanner, H. M.—The adaptation of modern instruments and increased operating speeds to restorative procedures: *J.A.D.A.*, 47:311 (Sept.) 1953.
2. Nelsen, R. J., Pelander, C. E., and Kumpula, J. W.—Hydraulic turbine contra-angle handpiece: *J.A.D.A.*, 47:324 (Sept.) 1953.
3. Street, E. V.—Effects of various instruments on enamel walls: *J.A.D.A.*, 46:274 (March) 1953.

\*Contribution from the Commonwealth Bureau of Dental Standards.

## News and Notes

### Constitution of European Co-Ordination Centre for Fluorine Research and Dental Caries Prophylaxis

The following information has been received from the General Secretary of this newly formed body:

"On the 7th and 8th November, 1953, an European Co-ordination Center for Fluorine Research and Dental Caries Prophylaxis was constituted in Constance, Germany. Its aim is to unite the personalities working actively in the fields of fluorine research and dental prophylaxis. The Organization will strive to spread the therapeutical measures resulting from experiments made by its members, or eventually to point out their misuse.

Only scientists doing clinical or experimental research in these special fields will be accepted as active members. They must be willing to share the result of their work collaborate without distinction of nationality.

Another aim of the Organization is to determine as exactly as possible, the fluorine's role in preventive and therapeutical dental medicine, as well as in the physiology of nutrition.

The members of the Organisation will keep in close touch through exchange of documents, thus enabling them to be reciprocally informed of the different experiments going on in various centres, avoiding at the same time useless experimentations or repetitions of research having already given positive results.

Last, but not least, a well co-ordinated co-operation will lead to better results. The European Organisation of Co-Ordination is in close relation to the European Center of Documentation on Fluorine whose seat is at the Institut de medecine dentaire de l'Universite de Geneve.

The first general meeting of the newly constituted organization will be held in Salzburg, Austria, in 1954, several outstanding personalities will give original lectures on fluorine's problems.

The committee constituted for the first year is formed as follows: President, Prof. A. J. Held (Geneva); Vice-president, Dr. H. R. Held (Geneva); General Secretary, Dr. H. J. Schmidt (Stuttgart-Degerloch); Second Secretary, Dr. S. Koller (Wolfsberg, Austria).

Seat of the European Organization of Co-Ordination for Fluorine Research and Dental Caries Prophylaxis is the Institut universitaire de medecine dentaire, 24, rue Micheli-du-Crest, Geneva, Switzerland."

### XLIInd Annual Meeting of the F.D.I.—Scheveningen, The Hague, Netherlands, June 8th - June 13th, 1954.

The 42nd Annual Meeting of the F.D.I. will be held at Scheveningen, Netherlands, by invitation of the three Netherlands Associations affiliated to the F.D.I.

During the same week the Dutch Profession is organising a Jubilee Congress to commemorate respectively the 75th, 50th and 40th anniversaries of their organisations.

The Organising Committee of the Jubilee Congress, under the Chairmanship of Dr. C. F. L. Nord, has arranged its headquarters during the Congress week at the Kurhaus Hotel. The headquarters of the Annual Meeting of the F.D.I. will be at the Palace Hotel. Both these hotels are splendidly situated, facing the North Sea beach, in the well-known seaside resort of Scheveningen, near The Hague.

The Scientific Programme of the Jubilee Congress will replace the Open Meetings and Scientific Sessions usually organised by the Federation during its Annual Meetings. In order to give everyone the opportunity of following closely the scientific programme, provision has been made for simultaneous translations in England, French and German.

The Jubilee Congress will be mainly devoted to prevention in all fields of dental practice, i.e., Prevention of Caries, Orthodontic Prevention, Prevention of Periodontal Diseases. The socio-economic aspects of prevention will be discussed and the organisation of dental treatment for the young will also be studied.

These subjects will be introduced by well-known colleagues from the Netherlands and other countries. Sufficient time has been reserved for panel discussions by experts on the themes covered during the Congress. Furthermore, films will be shown on these topics and a Dental Exhibition is also being organised.

Members can obtain further information concerning this Congress from the Association office.



## Dr. C. H. Graham

The resignation has been announced of Dr. Campbell Harry Graham from the position of senior lecturer in prosthetic dentistry at the University of Sydney. He has accepted an appointment to the chair of prosthetic dentistry at the University of Malaya.

Dr. Graham graduated with Class II Honours as a Bachelor of Dental Surgery from the University of Sydney in 1938. After a period of study at Northwestern University, Chicago, he was granted the degree of D.D.S. and in 1947 he was admitted to the degree of Master of Dental Surgery in the University of Sydney. He was appointed senior lecturer in prosthetic dentistry at the University of Sydney in 1945.

In the earlier years of his lectureship, Dr. Graham was faced with the huge task of organising the teaching of large post-war classes and more recently he accepted the responsibility of directing the courses of studies arranged for dental technicians at the United Dental Hospital of Sydney.

Dr. Graham's unselfish efforts, his sincerity and charm of manner have resulted in the establishment of a keen and unified band of teachers and in a very high standard of teaching in the Department of Prosthetic Dentistry.

The undergraduate has not been Dr. Graham's only concern. He has contributed to many Dental Congress programmes and has conducted numerous post-graduate classes.

The congratulations and good wishes of his colleagues go with Dr. and Mrs. Graham and their family in their new venture in Malaya.

## Post-Graduate Courses in Pharmacology

Following upon numerous requests from members, post-graduate courses in pharmacology have been arranged by the Association with the kind co-operation of Professor Thorp and the staff of the Department of Pharmacology, University of Sydney.

A two-day course of six lectures, primarily designed for country members, will be held on Monday and Tuesday, 24th and 25th May.

The second course will comprise a series of lectures on alternate Monday evenings, commencing on Monday, 3rd May.

## Masters of Dental Surgery

The following graduates were successful in the recent examinations conducted for admission to the degree of Master of Dental Surgery within the Faculty of Dentistry, University of Sydney:

G. Charlton, B.D.S. Bacteriology; R. E. Fortescue, B.D.S., Orthodontia; G. T. Hutchinson, B.D.S., F.D.S., R.C.S., Periodontia; R. L. Mobbs, B.D.S., Periodontia; G. Mumford, B.D.S., Operative Dentistry.

## Southern Tablelands Division

At the annual meeting of this Division, held on 14th November, 1953, the following office-bearers and committee were elected for 1954:

*Chairman:* Mr. J. B. Reilly.

*Hon. Secretary:* Mr. R. D. D. MacCulloch.

*Hon. Treasurer:* Mr. R. K. Fisher.

*Committee:* Mr. E. Smedley, Mr. J. H. Goldin, Mr. J. B. Hunt.

*Nominee as Additional Member of the Executive:* Mr. L. Marshall.

## North Eastern Division

At the last annual meeting of this Division the following office-bearers were elected:

*Chairman:* Mr. D. C. Craig.

*Hon. Secretary:* Mr. M. S. Neal.

*Hon. Treasurer:* Mr. R. Paul.

*Nominee as Additional Member of the Executive:* Mr. F. C. Haddan.

## Association Activities

### Australian Dental Association

#### FEDERAL NEWSLETTER No. 11.

Since the last Newsletter one meeting of the Federal Executive has taken place on 28th November, 1953. Matters dealt with at that meeting and certain matters in which finality has been reached since that date bear report.

#### Repatriation Dental Treatment.

After prolonged and time-absorbing negotiations with the Repatriation Commission, extending back to 1950, the last eight months have seen the finalisation and introduction of the Local Repatriation Dental Officer Scheme.



It is very pleasing to report that finalisation of principles and administrative procedures has at last been reached to the satisfaction of the Repatriation Commission and the Federal Executive acting in the light of Federal Council instructions.

The problems have been new and important and much work and many conferences have been necessary to reach the present satisfactory conclusion.

The Federal Executive appreciates the co-operation of the Repatriation Commission as long experience has proved that negotiations with Government Departments are inevitably involved and intricate, particularly when professional problems are concerned.

The Federal Executive wishes to express its appreciation of the continued attention given to these conferences and negotiations with the Commission in Melbourne by Dr. K. Adamson, Vice-President, and Dr. J. M. Wark, Interstate Vice-President, to whom much of the direct negotiation has fallen.

Applications for appointment as Local Repatriation Dental Officers were called for on 17th October, 1953, and it is understood that Panels are now being instituted.

At the same time applications were called for appointment as Senior Visiting Dental Officers, the duties of these Officers being to act in a consultative capacity on a high administrative level. The following members of the profession have been appointed in the various States:

|                 |       |                     |
|-----------------|-------|---------------------|
| N.S.W.          | ..... | Mr. E. J. Gee       |
| Victoria        | ..... | Dr. K. Skues        |
| Queensland      | ..... | Dr. G. B. Ferguson  |
| South Australia | ..... | Mr. P. M. Wesslink  |
| West. Australia | ..... | Mr. J. E. Throssell |

It is anticipated that the Scheme will now be developed within each State and, doubtless, small problems and details as to administrative procedures will occur from time to time until the organisation becomes standardised and fully effective. There must naturally be, in a nation-wide Scheme of such an extensive nature, minor hitches and the profession is asked to co-operate in overcoming these lesser difficulties.

#### *National Health Act.*

A Bill to introduce a National Health Act was before the House of Representatives in the latter part of 1953, being presented by the Federal Minister for Health, Sir Earle Page. This Act has been passed and assented to but to date, to our knowledge, only parts (1) and (2) of the Act have been promulgated.

The Act is designed to amend existing Federal Health legislation and co-ordinate the various Federal public health services within one Act.

Members are already aware of the continual approaches to the Minister for Health since 1950 to have the legislation concerning *Pharmaceutical Benefits* amended to allow dentists to prescribe such Benefits.

The efforts of the Federal Executive having been carried to their ultimate in this matter, by direction of the Federal Council, State Branches were advised that they could individually undertake further efforts. This resulted in a number of questions being directed to the Minister during the debate in the House of Representatives on the National Health Act.

A consensus of replies indicated that it was not the Government's intention, at the present moment, to widen the scope of the legislation governing Pharmaceutical Benefits but to confine same to the medical profession. The proviso was added, however, that every consideration would be given to the matter of extending the scope of the Benefits at the appropriate time.

Also contained in the Act are provisions for *Commonwealth Medical Benefits* which, since July, 1953, have been in force by Regulations made under previous Acts.

Analysis of these Regulations by the Federal Executive caused considerable concern in that it was noted that provision was made for the payment of a Medical Benefit in the matter of certain aspects of dental treatment.

In some cases certain items of treatment are of a common medical and dental nature; one outstanding anomaly appeared in the payment of a Commonwealth Medical Benefit in respect to radiographic examination of teeth. The attention of the Minister was immediately drawn to these anomalies.

Our representations were carefully considered by the Minister and resulted in the removal from the Schedules forming part of the National Health Act of the provision for the payment of a Commonwealth Medical Benefit in relation to radiography of the teeth.

A further provision has been inserted defining a Medical Benefit as being payable in respect to a general anaesthetic administered by a medical practitioner for a dental operation performed by a registered dentist.

The sections of the Act concerning Commonwealth Medical Benefits still await promulgation and when promulgated the above anomalies contained in the Regulations at present in force will be removed.

The Federal Executive is pleased to report a successful conclusion on the matter of Commonwealth Medical Benefits.

#### *National Dental Journal.*

In accord with the resolution of the Annual Meeting of the Federal Council in June, 1953, concerning the matter of the establishment of a National Dental Journal, a memorandum tabled by the Queensland Branch at that meeting has been circulated to State Branches for comment.

Replies from State Branches have been considered by the Federal Executive, who have discussed the matters particularly in regard to finance and possible administration.

It is appreciated that a Commonwealth-wide circulation of one Association Journal of high standard would give members a greater access to published papers and reviews and much more information on the activities of all Branches. Furthermore, the time has certainly come when the promotion and forwarding of the policies of the Australian Dental Association, as defined by the Federal Council, must be expressed in definite and uniform terms.

State Branches will be given further information for their consideration to enable a full discussion, in the terms of the resolution of the last Annual Meeting of the Federal Council after the Federal Executive Meeting in March. Every facet of this project will be fully considered immediately.

#### *Visit of Professor Bibby.*

The Federal Executive is very pleased to report the outstanding success of the recent short visit to Australia of Professor Basil Bibby.

The Association is very beholden to Professor Bibby, of the Eastman Dental Dispensary and the University of Rochester, New York, for the magnificent impact he made, both in professional and political circles with his views on the latest scientific developments in the field of preventive dentistry.

His concept of the role of fluoridation was most constructive and encouraging in all aspects.

The gratitude of the Association is extended not only to Professor Bibby for his brilliant and tireless efforts but also to the United States Educational Foundation in Australia for arranging the extension of a Fulbright Scholarship to make this visit possible.

Dr. Bibby's visit will have an important and far reaching effect on future policy concerning dental health services.

It is regretted that the visit of this distinguished dental scientist had to be limited to such a short period that a visit to all States was not possible.

As much as the Association would have desired such an extension it was impossible under the conditions of Professor Bibby's itinerary and Fellowship arranged by the United States Educational Foundation in New Zealand and its counterpart in Australia.

#### *Fluoridation of Drinking Waters.*

The National Health and Medical Research Council discussed this matter extensively at its last session in December, 1953, and the Association is pleased to report that two resolutions of the Council not only approve but recommend this procedure. The text of these resolutions has been conveyed in full to all State Branches and to the dental journals published in this country.\*

#### *Federation Dentaire Internationale.*

The Association, which is a corresponding member of this Federation, is endeavouring to encourage the taking up of "supporting membership" of the Federation by members and their subscription to the "International Dental Journal."

The Annual Meeting of the Federation will be held at The Hague in June, 1954.

The 12th International Dental Congress will be held in Rome during 1957.

#### *State Branch Presidents.*

The annual State Branch elections for the ensuing year resulted in the appointment of the following members:

|                   |                    |
|-------------------|--------------------|
| New South Wales   | Dr. F. E. Helmore  |
| Victoria          | Mr. Lindsay Newton |
| Queensland        | Dr. F. R. Vincent  |
| South Australia   | Mr. M. J. Barrett  |
| Western Australia | Mr. D. C. Baker    |
| Tasmania          | Dr. G. Hurburgh    |

Sincere congratulations are extended to the new State Branch Presidents with every good wish for a successful year of office.  
Federal Office,

Sydney,  
March, 1954.

J. V. Hall Best,  
Federal President.

\*These resolutions were published in the the Dental Journal of Australia, February, 1954, p. 29.

## Australian Dental Association (New South Wales Branch)

### GENERAL MEETINGS

The General Meeting of the Association for the month of March took place on Tuesday, 23rd of that month. Dr. A. W. Bull gave a most interesting address on a number of developments in dentistry and dental teaching which he had observed during the two years he spent in the United States of America as an assistant professor at the Northwestern University of Chicago. Dr. Bull's address will be published in the June issue of this Journal.

The President, Dr. F. E. Helmore, addressed the meeting on current Association affairs and it is his intention that these short talks should be continued throughout the year at the General Meetings.

### EXECUTIVE REPORT.

#### *Second Country Convention—Orange.*

Arrangements are in hand for the Second Country Convention of the Association to be held at Orange from the 20th-24th September, 1954. A brochure setting out arrangements for the Convention and containing an application form is being circulated to all members of the Association.

The Convention Commission extends a cordial invitation to all members to attend the Convention and asks for an early indication of members' intention to visit Orange on this occasion.

#### *Dental Health Competition.*

Members are being circularised concerning this competition which is to find the children with the best teeth in this State. The Dental Health Education Department of the Association is co-operating with the Youth Welfare Association of Australia in arranging the competition.

The Association requests every co-operation from its members in this matter as it is felt that the competition will result in a stimulation of the public's interest in dentistry and the maintenance of good dental health.

#### *Repatriation Dental Treatment.*

The Executive has been advised by the Federal Office of the Association that finality has now been reached in the institution of local repatriation dental officers for the treatment of patients eligible for repatriation benefits in relation to dental treatment.

A senior visiting dental officer has been appointed as a consultant to the deputy commissioner of repatriation in New South Wales.

Panels of local repatriation dental officers for various areas have also been established by the office of the deputy commissioner, and applicants for appointment to this position have been advised of the personnel of such panels.

#### *Conjoint Meeting of Delegates of Divisions and the Executive.*

The conjoint meeting of delegates from Divisions and the Executive of the Association for 1954 has been set down for Monday, 21st June, next.

#### *Annual Sports Day.*

The Annual Sports Day of the Association will be held at The Lakes Golf Club on Thursday, 15th July, 1954. On this occasion members will compete for the Sir Harry Moxham Cup in Golf and the J. V. Hall Best Bowls Trophy.

## *Abstracts of Current Literature*

*A short note on certain selected articles appearing in current overseas journals.*

**The Journal of the American Dental Association, Vol. 47, No. 6, December, 1953.**

*Radiobiology of the Oral Tissues:* Burstone, M. S.

A review of injuries caused to oral tissues by radiations. It includes a description of the ways in which isotopes are used in experimental investigations of cellular injury.

*Deposition of Radioactive Iodine in Teeth of Persons Treated for Disease of the Thyroid Gland:* Wainwright, W. W.; Bull, B. G.; Hauptfuehrer, J. D.; and Dute, H. L.

These investigators had the opportunity of arranging for the extraction of teeth from the mouths of patients receiving radioactive iodine, at intervals ranging from five hours to two weeks after the administration of the radioactive isotope. Their results indicate that the isotope had been taken up by the dental hard tissues within five hours and was retained there for at least two weeks.

*Trichloroethylene in Dentistry:* General Analgesia: Sadove, M. S.; Wyant, G. M.; and Spence, J. M.

The advantages and disadvantages of trichloroethylene analgesia for minor surgery are set out in addition to a full description of a suitable technique. The writers report that after experience with over 250 cases they consider this method can be of great use in dentistry.

- A *Clinical Study of the Forces Required to Dislodge Maxillary Denture Bases of Various Designs*: Skinner, E. W.; Campbell, R. L.; and Chung, P.

A series of base plates were made: two of normal design made from a paste-wash impression and an alginate impression respectively, one in which the labiobuccal surfaces were omitted and one in which the covering of the hard palate was omitted.

The most interesting results obtained were that whilst a post-dam of peripheral seal increased retention, the introduction of relief areas resulted in a decrease in retention, regardless of what other factors were present which might have tended to increase it.

**The Journal of Prosthetic Dentistry,  
Vol. 3, No. 6, November, 1953.**

*Planning and Designing Removable Partial Dentures*: Schmidt, A. R.

A well illustrated article covering the construction of upper and lower partial dentures. The need for careful planning is stressed.

*Partial Dentures — Relining the Saddle Supported by the Mucous and Alveolar Bone*: Wilson, J. H.

The need for relining Class II saddles is emphasised. Surgical preparation of the ridges is advised to reduce the difficulties which may be met later when relining. A technique for relining is set out.

*Operative Procedures and the Tooth*: van Huysen, G. and Boyd, D.A.

The authors confirm the efficacy of calcium hydroxide as a pulp protective. They consider that it should be used as a lining in all deep cavities.

*An Evaluation of the Various Claims for the Control of Dental Decay*: Kitchin, P. C.

The author believes any dentifrice used immediately after meals may assist to reduce caries activity. Lower concentration ammonia-urea dentifrices are of no value. Penicillin dentifrices are not of sufficient value to overrule the possibility of producing penicillin-resistant strains of bacteria.

Dietary control, fluoridation of water supplies and topical applications of aqueous solutions of sodium fluoride are all effective methods of control.

## New Books and Publications

PRACTICAL PEDODONTIA, by Floyde E. Hogeboom, St. Louis, 1953, The C. V. Mosby Company. Price £6/11/3 (Aust.). *Our copy by courtesy of Messrs. W. Ramsay (Surgical) Limited, Melbourne.*

Though Hogeboom is the author, he has had collaboration from four others, who have each written special chapters in this sixth edition.

Altogether, the book is made up of thirty chapters and an appendix, giving a total of 636 pages, and the reader cannot help but feel somewhat dismayed at the formidable task of reading such a mass of material on a subject which uses so many of the techniques of other main fields in dentistry. The book claims to be an introductory text for students and practitioners of dentistry.

Most students will find it has much information in it which they have already received from various sources throughout their course. This is a factor which should not be overlooked in present times when the cost of text-books is soaring. The defect is one which is all too frequently found by students and not only in their books.

An introductory text should do what the title implies. The reader would naturally expect that the book would be shorn of extraneous and repetitious matter and would very briefly deal with basic subjects which have been catered for by specialists in those fields. He will be disappointed.

The first chapter gives the reader something of what is to follow. The opening sentence is surely not an inspiring collection of words for one who has acquired a certain store of knowledge at the time when pedodontia is taken as a serious study. Here it is! "Way back down the road of time, man began his journey up the long winding trail of civilization." And Hogeboom gallops up the long winding trail to reach the brave new world—"How the age-old thrill of our new world beckoned the immigrant to establish a new civilization and a new home." However, amidst the verbiage we do find this jewel, "Pedodontia, in the broad sense, is dentistry for children."

It is unfortunate that this tendency for circumlocution has infected the book, for Hogeboom can, at times, give us the meat quickly and straightforwardly, even if a trifle short weight. For instance, there is a need for sound and adequate information on child management and all that this implies; unfortunately, this is dealt with all too briefly.

A critical reading of the chapter on oral habits will reveal that there is little added to the subject matter which is really helpful and, though, no doubt, giving the dentist the feeling of having achieved something, does not solve the child's problem.

Need embryology be given such eminence in this book? It is done quite satisfactorily by other authors and is dealt with by the student before he reaches the clinical phases of his study. The section on growth and development of the child's head can be read with profit, as also the intelligent presentation of anatomy, even though in the logical development of a dental course these subjects have been completely studied.

The principles of operative dentistry, exodontia and prosthodontia must surely be sound, whether for children or for adults. It is their application that has to be modified as occasion demands. No one wants to spend time reading about dental materials and vitamins; sketchy presentations add nothing of value to the writing for the keen student, be he undergraduate or practitioner. He already knows as much or more and knows where to seek additional information.

There are good chapters on the first permanent molar, the adolescent with rampant caries, prophylactic odontotomy and endodontia for the deciduous tooth. It would surely have been a better arrangement to group the biochemical aspects of preventive dentistry and the prevention of dental caries by nutrition together with the section on the adolescent with inter-proximal caries.

Preventive orthodontia, space maintenance and treatment of fractured teeth are more than adequately provided for, whilst a useful discussion is presented on disturbances due to endocrine dysfunction.

The final chapter of some seventy odd pages becomes almost a tour de force, nevertheless it is well worth reading critically, for it presents the newly developing subject of public health dentistry. As is to be expected, it deals with American conditions, has a fair share of propaganda and locally coloured opinions on highly controversial matters, and has, therefore, a limited, but nevertheless, definite value. One cannot but be impressed with the facts—despite the intense work in dental education and prevention—dental disease is as crippling in America as in any other country, but American dentistry is doing something about it.

The book is profusely illustrated, and despite the criticisms raised, if used intelligently, can be a useful work of reference.

—R.H.

TEXTBOOK OF EXODONTIA, by Leo Winter, St. Louis, 1953, ed. 6. C. V. Mosby Co. (550 pp., 386 illus.). Price 84/-. *Our copy by courtesy of W. Ramsey (Surgical) Pty. Ltd.*

This edition is the first revision of the book since the death of the author, and has been undertaken by his son and a collaborator.

It is stated in the preface that chapters on the chemistry of anaesthetic agents and general anaesthesia have been dropped and new chapters on diagnosis and history taking, chemotherapy and antibiotics, haemorrhage and alveoloplasty have been added. It is noticed that other matter, e.g. treatment of cysts and fractures of the jaw has also been removed. The book now contains 226 fewer pages than the previous edition. One has noticed this trend in recent times—cost of books rising and their contents falling.

Notwithstanding the general excellence of paper, binding, print and illustrations, several mistakes are evident. Two obvious errors persist from the fourth edition: Fig. 114 illustrating a tray for oral surgical procedures depicts instruments set out in order opposite to that in the caption. Figs. 267-271 whilst portraying the surgical removal of two impacted canines from the maxilla clearly show six anterior teeth in position in the arch. The latter illustrations and other sketches are dated 1923. Fig. 2a depicting the carpule syringe, shows the carpule being inserted the wrong way round. Several typographical errors occur, in particular the last two sentences on page 330. The whole meaning is thereby reversed.

Chapter one stresses the importance of adequate examination, history taking and diagnosis—points so often overlooked in a busy practice. A dentist examining a patient's mouth may often discover signs of local or general pathological conditions before a physician is consulted.

Chapter two is a discussion of psychological aspects. The operator should know his limitations and refer to a specialist anything beyond his scope, but he should not dictate the method of treatment.

The chapters on local anaesthesia deal with the dangers of insufficient knowledge of the actions and indications for use of appropriate drugs, lack of sterility or decomposition of solutions, caution in the rate of injection and danger of hypertonic solutions relative to post-operative pain. No mention is made of XYLOCAINE. Suggestions that syringes should be sterilized by boiling (preferably in a separate sterilizer to avoid damage), should be non-leaking and that needles should be made of stainless steel are all good practice.



Techniques for injection of local anaesthetic solutions for dental surgery are illustrated. Iodine is suggested for disinfection of mucosa prior to injection, but no mention is made of idiosyncrasy in some patients. A good summary of accidents and infections following local anaesthesia follows, including post-injection pain, accidental injection of alcohol, injury to the lingual nerve and breakage of needles.

The techniques for extraction of teeth are not of great importance to readers in this part of the world as they do not suit the instruments in common use and supply. However, sound reasoning is expressed in discussion of preliminary considerations, indications and contra-indications and post-extraction toilet. Surgical preparation of the mouth for dentures is also treated in a sound manner.

In the new chapter on prevention and treatment of haemorrhage the author mentions the importance of the patient's previous history, the factors involved, useful tests to differentiate the conditions, the importance of digital and biting pressure over long periods to control bleeding, but gives only very brief mention of the new absorbable haemostatics, and does not describe their uses and actions. He then suggests a return to the "shotgun" method of prophylactic medication in use before the more recent advances in haematology were made.

Again, in the new chapter on antibiotics warning is given about the indiscriminate and inadequate use of these drugs. Their importance in valvular lesions of the heart and against specific organisms is mentioned.

This book undoubtedly has a useful place as a reference for student and practitioner in dentistry.—*T.R.C.*

CLINICAL PERIODONTOLOGY, by I. Glickman, Philadelphia, W. B. Saunders, 1953. (P. 1,019, 742 illus.). *Our copy by courtesy of the publishers.*

The essential value of this new book is a refreshing and logical analysis, developed from a sound basic knowledge of many of the problems of aetiology and treatment of periodontal disease. Unfortunately such features are obscured by the almost monumental verbosity of the text.

Presentation of such sections as the author's six types of gingival enlargement and four grades of bifurcation involvement, as acceptable and necessary facts suitable for inclusion in a text, is a little premature. They are, at the moment, more properly subjects for discussion and examination in the literature.

Elimination of these and other irrelevancies together with a more critical evaluation of the conflicting opinions introduced into the text,

would do much toward a more readable and better developed book. The text is copiously illustrated and diagrams are frequently used; simplification of some groups of diagrams is, however, carried out to the point of redundancy.

The bibliography, prepared with the assistance of the author's graduate students from many lands, is most extensive.—*G.T.H.*

ACCEPTED DENTAL REMEDIES 1954, Chicago, 1953, American Dental Association. (207 pp. illus.). *Our copy by courtesy of the publishers.*

This book, controlled by the Council on Dental Therapeutics of, and published by the American Dental Association is, in its previous editions, well known to the writer and has been recommended to undergraduates in the Faculty of Dentistry, University of Sydney, for some years as a useful addendum to pharmaceutical literature. It has the advantage of annual revision and coming as it does in the early part of the year is in time to be incorporated in this year's recommended literature.

Like the British Pharmaceutical Codex it contains remedies not incorporated in the Pharmacopeia. It has the minor disadvantage, to us, of having its posology in the metric system, which should be adopted here. The subject matter, which includes a chapter on prescription writing, is well arranged and shows the careful regulations governing the issue of the seal of acceptance of dental remedies by the Council. The chapter on sodium fluoride, while stating definitely that it is caries inhibitor, lists only methods of preparing 2 per cent. solutions for topical application by professional personnel and indicates that they are not prepared to advise general internal application at present. The chapter on antibiotics lists aureomycin, bacitracin, chloramphenicol, oxytetracycline (of which Terramycin is a brand), penicillin, streptomycin and tyrothricin, none of which are startling additions to the group, seeming to indicate a commendable conservatism. There is also a useful section devoted to nutritional factors.

The book is a definite contribution to available literature.—*L.G.C.*

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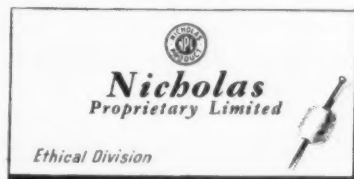


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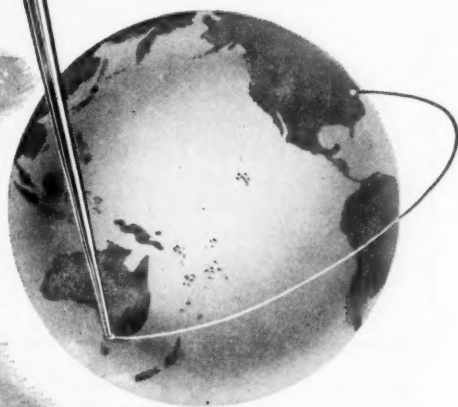


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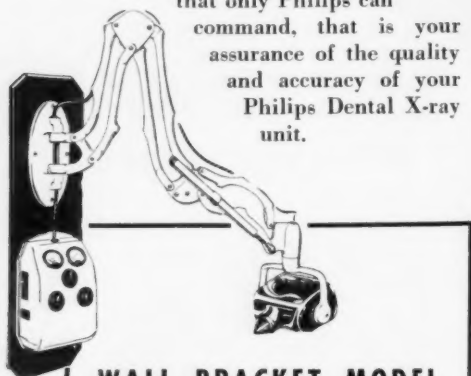
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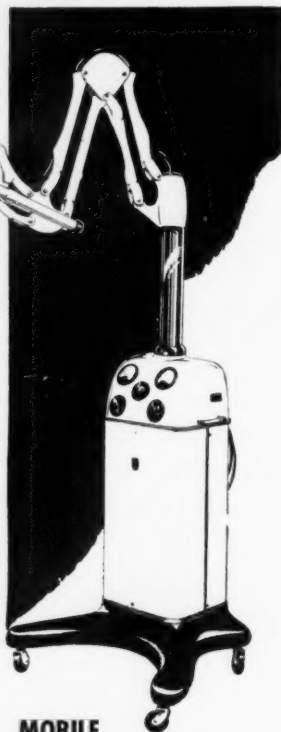
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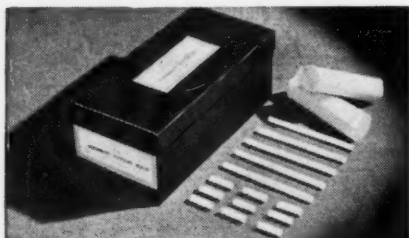
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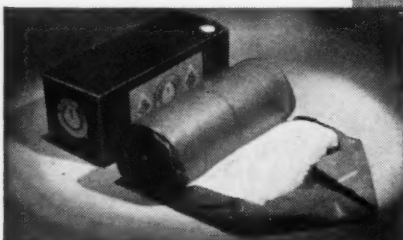
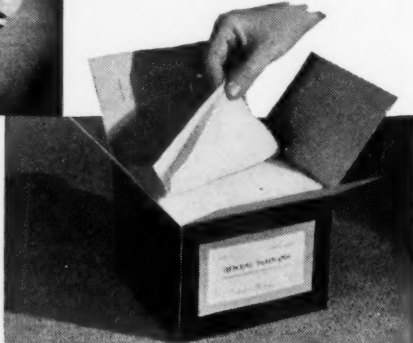


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Made of high-quality absorbent cotton—firm, compact, conforming readily to the mouth contour. Specially sized to prevent harshness of the outer skin. Available in  $\frac{3}{4}$ " and  $\frac{1}{2}$ " diameters.  $1\frac{1}{2}$ " and 6" lengths.

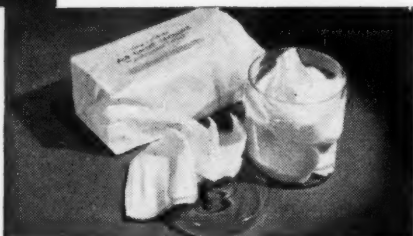


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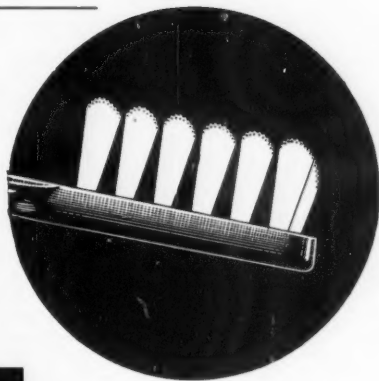
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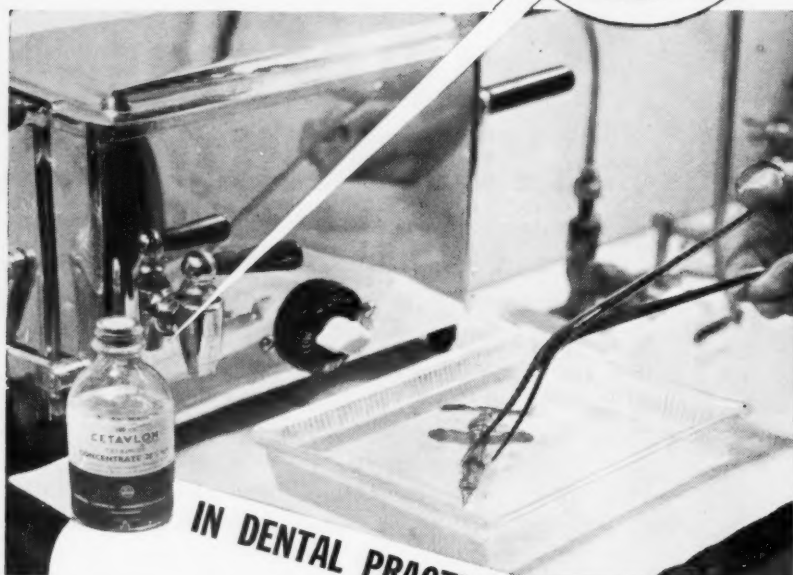
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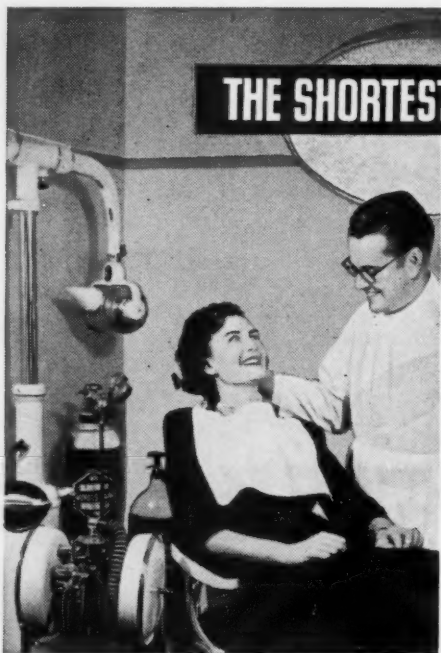
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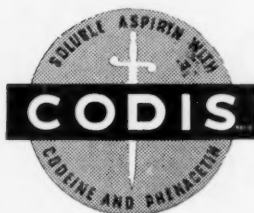
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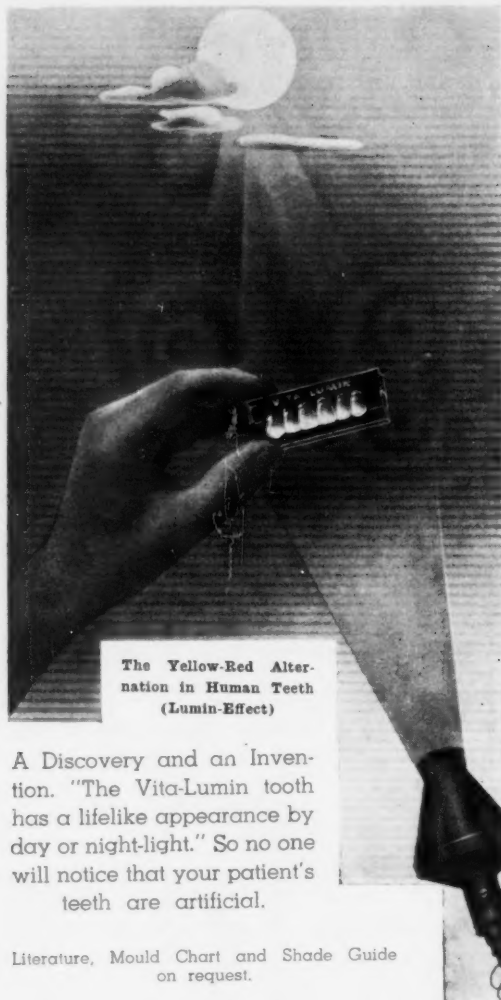
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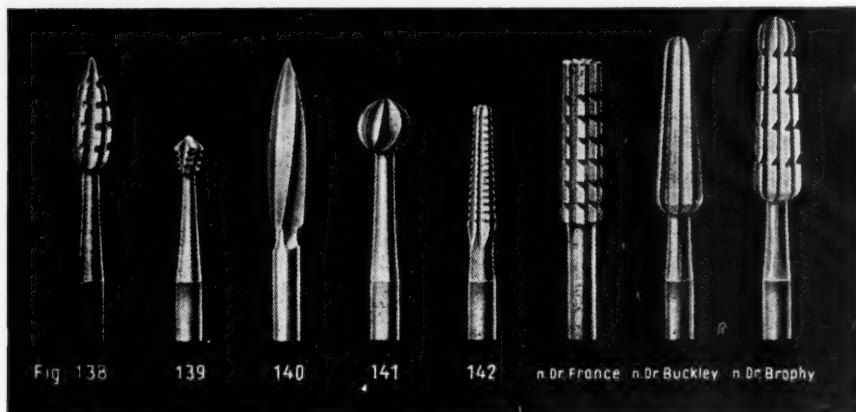
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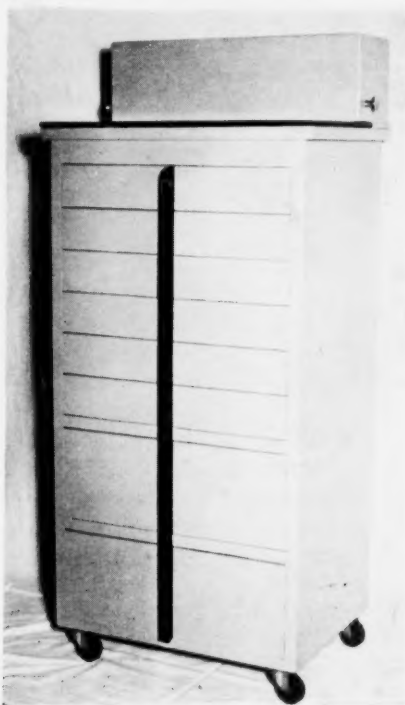
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